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News of the Industry Begins Page 816

AUTOMOTIVE INDUSTRIES

Volume 61
Number 25

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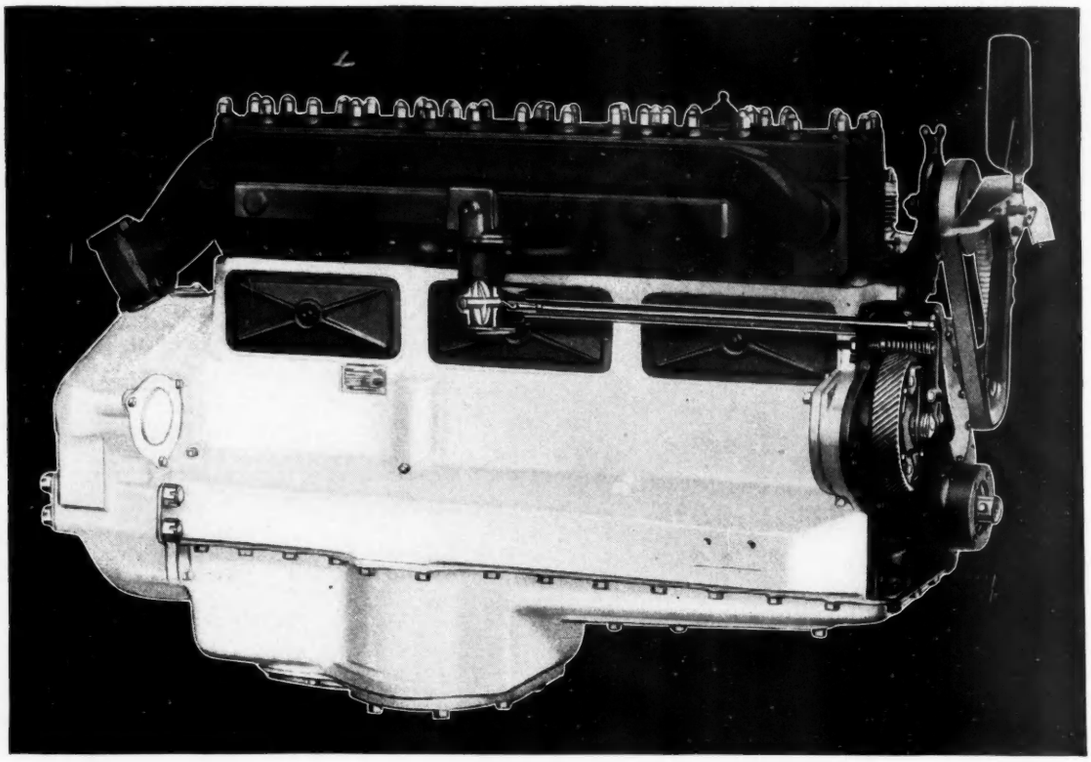

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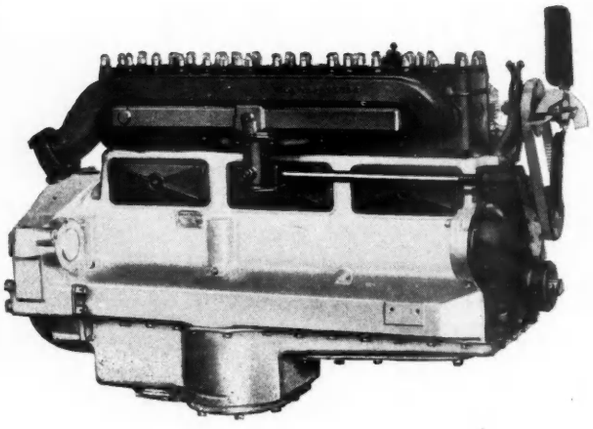

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985

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AUTOMOTIVE INDUSTRIES
The AUTOMOBILE

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Established 1902

Vol. 61 No. 25

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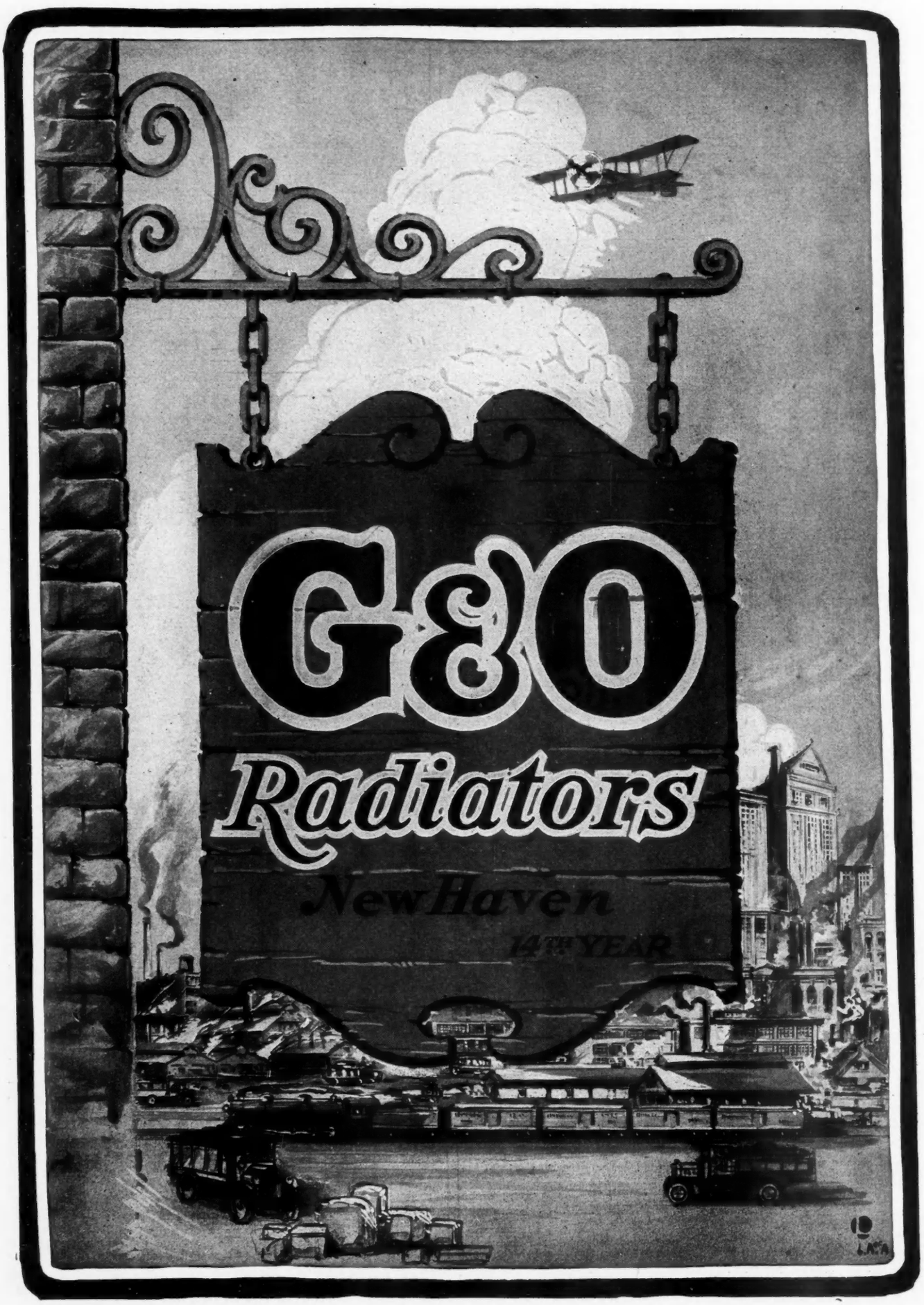
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AUTOMOTIVE INDUSTRIES

VOLUME 61 *Philadelphia, Saturday, December 21, 1929* NUMBER 25

Smaller Output *Estimated for 1930 Gives Assurance* of Stability

Automobile industry expected to be established on sounder basis next year by price increases and efforts to regulate production.

By EARL O. EWAN

A NEW year has begun on the production lines in Detroit and other automotive centers, with the opening of the 1930 automobile show season just two weeks away. Numerous new models, which are trundling with as yet irregular frequency from manufacturing plants to testing courses and thence to shipping departments, have attracted the attention of the industry and its close followers, that less than two months ago was held for a brief but gloomy moment by the writers of dirges in economics.

What output figures will be recorded in 1930 for the units going into production and those that are to be placed on the lines in the next year, is the subject of somewhat varying estimates. As a background for any forecast, it is needless to repeat to those of the industry that in 1929 the automobile business has experienced an all-time record year. Likewise, there is no excuse for overlooking the rather general consensus that despite the favorable outlook for a very satisfactory passenger car business in 1930, it is not expected to equal that of 1929.

Furthermore, it has been contended with apparently sound logic that a business volume in 1930 similar to that of 1928 would be a wholesome stabilizer for the industry, and particularly the merchandising phase of it. What's more, the predictions for 1930 production range from around the figure for 1928, which was 4,601,141 units, to 5,000,000. The last named figure has been quoted by Alvan Macauley, president of the Packard Motor Car Co. and the National Automobile Chamber of Commerce.

A rather unanimous conviction is felt in the industry that production, at least in the opening quarter and perhaps throughout the first half of 1930, will be more carefully regulated to meet demand than heretofore. This is being interpreted to mean that there will be few, if any, spurts in output during the opening quarter of next year while the industry is feeling the pulse of the market. By March, perhaps, and certainly by the beginning of the second quarter, the trend of the demand curve should have been plotted with satisfactory definiteness to warrant the stepping-up of production to sizable figures. This momentum should carry over into the third and fourth quarters to the extent that their production may surpass that of the same periods in 1929. Therefore, the year may turn out to be somewhat reversed from the customary production and sales viewpoint, with the first quarter being devoted by the industry to getting into pace with the market again while the restoration of public confidence is progressing.

Without further ado, however, we herewith present the 1930 outlook as seen by *Automotive Industries* on the basis of present facts, figures, opinions and general business analyses, certain of which are discussed in the following pages:

Estimated Total Motor Vehicle Production for 1930—4,945,000

United States and Canada

Passenger Cars		Trucks	
Estimated United States and Canadian production	4,100,000	Estimated United States and Canadian production	845,000
Estimated Canadian Production	200,000	Estimated Canadian production	60,000
Estimated United States production	3,900,000	Estimated United States production	785,000
Estimated United States domestic sales to dealers	3,300,000	Estimated United States domestic sales to dealers	500,000
Estimated exports and foreign assemblies	600,000	Estimated exports and foreign assemblies	285,000

Obviously all of the above figures are purely estimates; in compiling them the hope has been to have them correct within plus or minus 5 per cent. Some of them are admittedly open to dispute statistically, but they represent a careful consideration of all the data relating both to general business conditions and to past automotive performance specifically. They are recorded thus definitely merely in the hope of conveying a general idea of the outlook quickly, and in no sense as being an accurate quantitative representation

Estimated Total Motor Vehicle Production for 1929, 5,650,000

United States and Canada

Passenger Cars		Trucks	
Estimated United States and Canadian production	4,835,000	Estimated United States and Canadian production	815,000
Estimated Canadian production	214,500	Estimated Canadian production	58,000
Estimated United States production	4,620,500	Estimated United States production	757,000
Estimated United States domestic sales	4,000,500	Estimated United States domestic sales	515,000
	620,000		242,000
Estimated exports and foreign assemblies	486,000	Estimated exports and foreign assemblies	279,000
Increase in dealer stocks	134,000	*Decrease* in dealer stocks	37,000

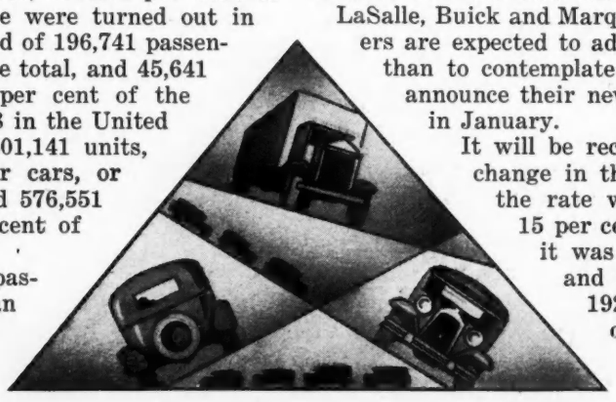
In the light of present guide posts pointing to reduced output in 1930, it is interesting to analyze recent production trends. In the first ten months of this year, there were produced in the United States 5,017,806 automotive units, consisting of 4,339,964 passenger cars, or 86.5 per cent of the total, and 677,842 commercial vehicles, or 13.5 per cent of the aggregate. Within the same period, there were turned out in Canada 248,376 units, composed of 195,935 passenger cars, or 78.9 per cent of the total, and 52,441 commercial vehicles, or 21.1 per cent of the aggregate. The total production for the United States and Canada for that period was 5,266,182 units, comprised of 4,535,899 passenger cars, or 86.1 per cent of the total, and 730,283 commercial vehicles, or 13.9 per cent of all.

Reference to production statistics for the first ten months of 1928 affords an interesting basis of comparison. In that period of last year, there were produced in the United States 3,867,503 units, consisting of 3,404,402 passenger cars, or 88.1 per cent of the total, and 463,101 commercial vehicles, or 11.9 per cent of the aggregate. In the same period of 1928, there were turned out in Canada 221,188 units, composed of 181,853 passenger cars, or 82.2 per cent of the whole, and 39,335 commercial vehicles, or 17.8 per cent of the total. The aggregate production in the United States and Canada for the first ten months of 1928 was 4,088,691 units, comprised of 3,586,255 passenger cars, or 87.7 per cent of the total, and 502,436 commercial vehicles, or 12.3 per cent of the aggregate.

During the entire year 1928, there were produced in the United States 4,358,759 units, consisting of 3,827,849 passenger cars, or 87.8 per cent of the total, and 530,910 commercial vehicles, or 12.2 per cent of the aggregate. In 1928, there were turned out in Canada 242,382 units, comprised of 196,741 passenger cars, or 81.2 per cent of the total, and 45,641 commercial vehicles, or 18.8 per cent of the aggregate. Production in 1928 in the United States and Canada totaled 4,601,141 units, embracing 4,024,590 passenger cars, or 87.5 per cent of the total, and 576,551 commercial cars, or 12.5 per cent of the aggregate.

Turning to the subject of passenger car sales figures, an analysis indicates that the total of new registrations for 1929 will approximate 4,000,500 units as compared with 3,220,000 for all of 1928. With the brunt of the recent stock market precipitation having fallen on the dealers, in so far as the automobile industry is concerned, however, it is predicted that next year, as a means of self-preservation, dealers will have to induce motor vehicle owners to stand most, if not all, of the depreciation on their used vehicles. It was the assuming of considerable of this depreciation by dealers in trade-in transactions that brought embarrassment to many of their number this year. Since there probably will be fewer dealers left next year as a result of this experience, the smaller number cannot shoulder additional depreciation charges, and, in fact, will be forced by economic laws to reduce the amounts from what they heretofore have assumed. They will have to teach the public to expect a 40 to 50 per cent depreciation in the value of its cars in the first year. The president of one outstanding motor car company in the large volume production field summed up the situation by saying: "The difference between a good dealer and a bad one is in the knowledge of used car prices."

Present indications in manufacturing circles should give hope to dealers for a profitable 1930, even though their sales volumes doubtless will be smaller in most instances. Probably the outstanding favorable factor is that there appears to be little intention on the part of other manufacturers to follow the lead of the Ford Motor Co. in reducing its car prices and simultaneously its dealer discount rate from 20 to 17½ per cent. In fact, the present trend of car prices is upward, which should assure satisfactory earnings in 1930 on reduced volumes, as well as the maintenance of dealer discounts at present levels. Studebaker recently took the lead in announcing price increases on cars and was followed by Cadillac and LaSalle, Buick and Marquette and Nash. Other makers are expected to adhere to this tendency rather than to contemplate price reductions when they announce their new models next week or early in January.



It will be recalled in connection with the change in the Ford dealer discount that the rate with that company had been 15 per cent up to August, 1918, when it was increased to 17½ per cent, and that it was raised in April, 1922, from that figure to 20 per cent, where it remained until last November when it was reduced to 17½ per cent.

This would seem to indicate that in their most prosperous days, Ford dealers made their profits on a 17½ per cent discount basis.

The chief unfavorable factor that dealers now are working to overcome is the prospect of new passenger car stocks showing on Jan. 1, 1930, an increase of 134,000 over the number on hand on Jan. 1, 1929, or, in other words, an increase of 37.3 per cent. In actual figures, the increase is from 359,000 to 493,000 cars. This is partly accounted for by the greater number of body models produced this year by the manufacturers, and the growth in the number of color combinations used. Solution of an even greater problem is being attempted by dealers, however, through their efforts to lower used car stocks, which are expected to show on Jan. 1, 1930, an increase of around 15 per cent above the number on hand on Jan. 1, this year.

More assistance will be offered the dealers in confronting these problems by the manufacturers in the months to come, factory activities indicate. It appears that one of the plans which may be fostered by several automobile makers is that of encouraging and helping the dealer to realize more profit from parts sales and his service department. An example of a centralized plan for giving such assistance is the Chrysler Motors Parts Corp., formed as a division of the Chrysler Corp. in the spring of 1929 and placed in operation to a limited extent on Sept. 1, 1929, through Chrysler distributors and certain dealers handling the De Soto, Plymouth, Dodge and Fargo lines. Plans call for its expansion to include all the dealers handling these makes of cars on Jan. 1, 1930. The General Motors organization in the United States is an example of a decentralized plan for supplying dealers with parts. General Motors Products of Canada, however, operates on the centralized plan.

The cut this week of $160,000,000 in the income tax, which will be an immediate help to automobile manufacturers as corporations, has called attention in the motor industry to other legislative proposals of interest to it that are scheduled to be considered in the present session of the Seventy-First Congress. Among the important subjects in this category are the plan for increasing Federal highway aid, interstate bus regulation, proposals for Inter-American highway development, and the tariff.

An increase of $50,000,000 in the annual appropriation for Federal highway aid is probably the most important piece of contemplated legislation in which the automobile industry is interested. Under the terms of bills introduced by Senator Lawrence C. Phipps, of Colorado, and Congressman Cassius Dowell, of Iowa, chairmen of the Senate and House roads committees, respectively, the total authorization for Fed-

(Continued on page 909)

Instalment Contracts Purchased

1929	TOTAL			NEW CARS FINANCED		
	Number of Cars	Volume in Dollars	Dollars Per Car	Number of Cars	Volume in Dollars	Dollars Per Car
January	147,008	$71,939,872	$489	76,157	$47,188,573	$620
February	177,960	85,263,846	479	101,712	60,485,230	595
March	290,422	136,287,410	469	164,648	96,505,505	586
April	363,339	168,844,566	465	203,224	119,630,526	589
May	381,810	176,227,801	462	210,303	123,691,554	588
June	369,968	171,883,530	465	202,457	120,771,728	596
July	363,226	165,310,672	455	205,369	117,936,478	574
August	323,429	151,595,703	469	177,204	107,052,134	604
September	282,818	131,723,060	466	155,075	92,008,795	593
Total (9 mos.)	2,699,981	$1,259,076,460	$472	$1,496,149	$885,270,523	$592

1929	USED CARS FINANCED			UNCLASSIFIED		Number Used in Per Cent of New
	Number of Cars	Volume in Dollars	Dollars Per Car	Number of Cars	Volume in Dollars	
January	66,400	$22,702,351	$342	4,451	$2,048,948	87.2
February	71,520	22,597,517	316	4,728	2,181,099	70.3
March	118,281	36,526,060	309	7,493	3,255,845	71.8
April	151,498	45,381,285	300	8,617	3,832,755	74.5
May	163,500	49,048,413	300	8,007	3,487,834	77.7
June	160,736	48,116,003	299	6,775	2,995,799	79.4
July	151,555	44,704,872	295	6,302	2,669,322	73.8
August	141,598	42,499,925	300	4,627	2,043,644	79.9
September	123,445	37,853,924	307	4,298	1,860,341	79.6
Total (9 mos.)	1,148,533	$349,430,350	$304	55,298	$24,375,587	76.8

THE accompanying table gives data concerning the number of cars financed and the volume in dollars of instalment contracts purchased for the first nine months of this year, as reported by 369 finance companies to the National Association of Finance Companies, 33 South Clark Street, Chicago, Illinois. It appears that both new and used cars were on the average higher priced, or at least were financed for more money, at the beginning of the year than in the later months. Also, that the used cars financed in January were considerably more numerous in proportion to new cars than in any subsequent month.

Automotive Industries
December 21, 1929

Fundamental *Production Formulas*

Discussion at management session of the 50th annual meeting of the A. S. M. E. in New York indicates the limitations involved in applying empirical equations.

By JOSEPH GESCHELIN

IMPETUS has been given to the further consideration of economic manufacturing lots as the result of a forum discussion of this topic at the management session of the 50th Annual Meeting of the A.S.M.E. Three papers were presented in which were given the views of the industrial engineer, the results of a system now in operation, and another dealing with the scientific basis underlying the derivation of management formulas. Original research in this latter field is under way at the Economics Department of the Massachusetts Institute of Technology under the auspices of the Management Division of the A.S.M.E. Spirited discussion at the conclusion of this meeting, in which many prominent speakers participated, indicated a real and growing interest in this field.

"Advantages Derived from the Simplification of the Fundamental Formulas for Economic Production Quantities" was the subject of a paper contributed by Fairfield E. Raymond, assistant professor of industrial research, Massachusetts Institute of Technology. In opening, Professor Raymond stressed the need for determining economic lot sizes in intermittent operations by the use of mathematical expressions. The chief problem, as he sees it, is to strike a compromise between preparation costs and the accruing charges. Among the factors which determine the type of formula to use, he suggests the following: storing, preparation charges, set-up charges. Simplified formulas are safe to use because the resulting values always will be greater than with the fundamental equation.

Equation 1 is the formula which represents all of the complexity of the variables entering into the calculations for the economic production quantity. However, current practice makes it possible to eliminate some of these factors so that the equation may be rewritten in a simplified form, as in Equation 2. The significance of the symbols is also explained.

"The next step in simplification," continues the professor, "will consist of a study of the general form of equation (2) in order to determine the relative importance of the various major elements in its composition, and to eliminate such elements as have little or no effect upon the final results when the conditions governing a specific problem are fully understood. To facilitate the discussion and provide a suitable basis for comparison, equation (2) will be rewritten so as to show only the major elements, as follows:

$$Q_e = \sqrt{\frac{K_F}{K'_s + K'_w + K'_v}} \qquad [3]$$

where

K_F = all items in the numerator $= F \cdot Y_a$

K'_s = investment charge element for articles in stores

$$= c' \cdot i \cdot \left[\frac{1}{2} - \frac{Y_a}{D}\frac{(1 - 1/n)}{2}\right]$$

K'_w = investment charge element for work in process

$$= \left(\frac{m + c'}{2}\right) \cdot i \cdot Y_a \cdot t$$

K'_v = space charge element for articles in stores

$$= \frac{v \cdot B}{h}\left[1 - \frac{Y_a}{D}\left(1 - \frac{1}{n}\right)\right]$$

"Another device," suggests Professor Raymond, "may be introduced at this point to assist in designating in a given case the form required for calculating a value for the production quantity Q by attaching a characteristic subscript to the general symbol as, for instance, Q_u equals any uneconomic production quantity varying to some degree from the economic production quantity Q_e. Similarly, Q_{sv} would indicate that this quantity is determined by the use of the storage and space charge elements in the denominator. It should be noted that the numerator in all the simplified expressions is the same and is represented by the element K_F."

SIMPLIFIED FORMS
Derived from Equation 2

Simplified Forms	Expressions for e
$Q_{sw} = \sqrt{\frac{K_F}{K'_s + K'_w}}$	$e_{sw} = \frac{K'_s + K'_w}{K'_c}$
$Q_{sv} = \sqrt{\frac{K_F}{K'_s + K'_v}}$	$e_{sv} = \frac{K'_s + K'_v}{K'_c}$
$Q_{wv} = \sqrt{\frac{K_F}{K'_w + K'_v}}$	$e_{wv} = \frac{K'_w + K'_v}{K'_c}$
$Q_s = \sqrt{\frac{K_F}{K'_s}}$	$e_s = \frac{K'_s}{K'_c}$
$Q_w = \sqrt{\frac{K_F}{K'_w}}$	$e_w = \frac{K'_w}{K'_c}$
$Q_v = \sqrt{\frac{K_F}{K'_v}}$	$e_v = \frac{K'_v}{K'_c}$

With this preliminary information as a starting point, the author has devised two sets of calculation sheets (Page 895) suitable for use in the planning or production departments. In explaining their use the author says: "The first form, for general use, outlines the procedure for determining the simplified form applicable to any specific problem. The second provides means for establishing the maximum allowable limits of variation in production quantities from the ideal or economic quantity, for any problem, with due regard for

Are Simplified for Practical Use

the normal profit expected in return for the sale of such articles, and provides a check as well upon the method of selection in Part I by the determination of the permissible variation in the answer for a given form.

"It should be noted that the last section can be omitted when the probable limits of usefulness for a given case have been previously determined or assumed from experience to warrant the use of the form selected without further computations." These working sheets are used in conjunction with a chart which gives values of C, K and E.

The latter part of the paper is a mathematical analysis of the data and method leading to the work sheets. Here the author proves the validity of the technique and shows how all variations and approximations have been rationalized. The author feels that these calculation sheets are the key to the adoption of management formulas and concludes the statement that, "The final form for the calculation sheets appearing in Tables 1, 2, 3 and 4 was adopted, as it is believed that the methods developed by means of this study could be more readily applied in this manner to the practical problems of industry, and that continued recourse to the theory could thereby be avoided. Of course, it would be possible to devise other forms of presentation and a wholly graphical method would be quite practicable. It is hoped as experience grows in the use of simplified forms, that numerical values can be assigned to the various index ratios which will definitely indicate the range of usefulness of each form, as it would be possible under such conditions to omit the procedure outlined in Parts I and II. Likewise, a further study of the values of the factors E_m, E_a, e_a, and λ will materially aid in the universal acceptance of these methods."

Fundamental Equation

$$Q_e = \sqrt{\frac{F \cdot \{2\Theta Y_a - \Delta \cdot [\Theta Y_a + Y'_r (f-1) \cdot i]\}}{c'i \cdot \left[(k+f-1)\cdot\Delta - \Theta\frac{Y_a}{D}\left(\frac{1-1/n}{2}\right)\right] + \left(\frac{m+c'}{2}\right)\cdot i \cdot \Theta \cdot Y_a \cdot t + \frac{vB\Delta}{h}\cdot\left[1-\frac{Y_a}{D}\left(1-\frac{1}{n}\right)\right]}} \quad \ldots\ldots [1]$$

where Qe = the economic production quantity (pieces)
f = reserve stock factor (see original paper)
Δ = coefficient of deterioration (see original paper)
Θ = coefficient of obsolescence (see original)
$Y'r$ = the total sales up to the order point in the previous sales turnover period (pieces)

Simplified Equation

$$Q_e = \sqrt{\frac{F \cdot Y_a}{c' \cdot i \cdot \left[\frac{1}{2} - \frac{Y_a}{D}\cdot\left(\frac{1-1/n}{2}\right)\right] + \left(\frac{m+c'}{2}\right)\cdot i \cdot Y_a \cdot t + \frac{v \cdot B}{h}\left[1-\frac{Y_a}{D}\cdot\left(1-\frac{n}{1}\right)\right]}} \quad \ldots\ldots [2]$$

INTERPRETATION OF DATA

Item	Symbols	Definitions
1	m	*Unit Material Cost* (in dollars per piece).
2	c'	*Unit Production Cost* (in dollars per piece).
3	F	*Preparation Cost* (in dollars per lot).
4	t	*Unit Production Time* (*a decimal figure in days*)
5	Y_a	*Consumption Rate* (pieces per year) (Obtain the most reliable estimate possible for the total consumption of this part or assembly, whichever the case may be, for the current year.)
6	i	*Interest Rate* (in per cent per year) (Obtain the figure for the interest rate in per cent per year which ordinarily would be paid on borrowed capital and which would be used to compute the cost of capital employed.)
7	v	*Space Charge* (dollars per sq. ft. per year)
8	h	*Average Height* to which storage is permitted in finished parts stores (in feet.)
9	B	*Unit Storage Space Required* (cu. ft. per piece.) (Optional Data, for Special Use Only.)
10	D	*Rate of Delivery to Stores.* (pieces per year) (When the manufacturing and sales periods overlap, determine the number of articles per day which can be removed from the process as fast as the fabrication or assembly of each is completed. If no overlap occurs the factor $kp = 0$ should be used.)
11	n	*Number of Batches per Lot.* (When a lot is divided into batches for ease in processing, n should represent the number of subdivisions, and if the lot can be processed continuously, $n = 1/0$ or $kp = 1$.)

"Use of Economic Manufacturing Quantities," by Robert W. Kent, summarizes a consulting engineer's experience with management formulas and their application. The author points out that a major problem is the difficulty of getting people to use empirical formulas because of their unfamiliarity with them. Another complication is the variety of formulas and the attendant danger of erroneous selection and application, for, as Mr. Kent says, "Determination must be made as to whether one uses as factors in the formula the direct cost only or the total cost, with or without overhead, and whether these factors include items which are really independent of quantity. Also, consideration must be given to the factors involving cost of capital. Shall inventories only be included or shall work in process be included? Must operating space charges be included as factors, and must space charges for inventories be included? Consideration must be given to all of the foregoing and the situation be weighed and the proper solution arrived at."

Variable Factors in Formulas

Then, too, there is no definite agreement as to the use of certain variable factors in these formulas, perhaps for lack of concrete definition. "For instance," the author explains, "a space factor, or space charge, is frequently included in a formula for economic manufacturing quantities and applied even in cases where the particular factory under consideration is entirely overequipped with floor space. In fact, it is probable that the majority of manufacturing plants in operation today have floor space available perhaps 50 per cent in excess of their real requirements. Obviously, it is not basically sound to assume that inventory is accumulating a rental charge under such conditions."

"The early reaction," the author then relates, "to the attempted use of scientifically determined economic manufacturing quantities was that, were the quantities mathematically established as the proper ones to manufacture at one time actually made use of, inventories increased to an extent which sound business judgment proved was dangerous. Hence, instances are known where economic quantities were carefully calculated and then arbitrarily quartered or halved in order that inventories might be kept within reason. It is probable that the reason for the necessity of thus reducing the quantities which mathematics had told should be used, lay in the many intangible things which it is so hard to anticipate, such as obsolescence due to sudden style changes, or obsolescence due to the development of new materials (as, for instance, the introduction of rayon into the textile industry as a whole)."

Advantages of Scientific Procedure

Mr. Kent sums up his message as follows: "No sound rule-of-thumb procedure for determining how much to manufacture at one time has been encountered in a careful consideration of nearly one thousand manufacturing establishments. A sizable field for the effecting of economies through the application of a scientific procedure of determining how much to manufacture at one time very definitely exists. It is worth while to inject mathematics into this general problem even if some elements or factors which should be included are dispensed with to make the procedure more salable. Even in instances where such formulas, even lacking certain necessary elements, are used, advantages are gained in that various items going to make up inventories as a whole are brought relatively more nearly in balance. One very distinct advantage of making use of economic manufacturing quantities is that periods of peak production and sales are met much more easily, and the additional cost, due to changing sizes of manufacturing lots, can be definitely known. It is almost always true that in making use of economic manufacturing quantities cost-collection methods are radically improved. Overhead items are brought more definitely within control, and many advantages are thus gained which were not necessarily the objects in view when the methods were adopted."

"Twelve Years' Experience With Economic Production Quantities" summarizes the results of scientific management at the plant of Eli Lilly & Co. The author of this paper, C. H. Best, describes the derivation and application of his formula in a plant which manufactures about 2400 products, marketed in over 8500 different packages.

"In the early part of 1917," Mr. Best explained, "work was begun on the assembly of data from which to derive mathematical formulas that would determine the economic production quantity. The task was to express algebraically the total cost of producing a batch of merchandise and of carrying that merchandise until it was sold. This expression has been termed the 'total-cost expression,' and will be referred to by this term. The first derivative of the total-cost expression, when set equal to zero and solved, gives the economic production quantity or the cheapest batch size that can be made. Larger and smaller batches than the economic production quantity will both produce a higher unit cost than batches made in this exact amount.

Simplicity in Calculation

"The simplicity of the calculation for determining economic production quantities is shown by the following example: The formula used is

$$N = 262.8\sqrt{\frac{Y}{M + 202}}$$

where N = economic production quantity in units
Y = number of units sold per year, and
M = cost of material in cents per unit.

"Let Y = 14,000 gallons and M = 850 cents per gallon; then the solution of the formula gives N = 958 gallons, or the economic batch size.

"The solution is an easy slide-rule calculation.

"To make a larger or smaller batch will cost more than it will cost to make a batch of 958 gallons.

"During the year 1917," the author continued, "the production of the plant was handled in 25,633 batches with a labor force of 554. Since 1917 the annual output of the plant has very materially increased. In 1928 the increased output was handled in 13,453 batches with a labor force of 482.

"A force of about 23 persons carries on the routine detail of the planning department, which department has been put into operation since 1917. The planning department also operates the perpetual inventory records of finished stock. The work done by the planning department is deemed practically indispensable, but the cost of maintaining it would be very substantially more than present costs if production quantities had not greatly reduced the number of operations that have to be planned. Whether this department could function properly at a reasonable cost without economic production quantities is a question.

"Among the benefits to us of this scientific method of planning," concluded the author, "are the following:

"1. Considerably more production with 13,453 batches in 1928 than with 25,633 batches in 1917.

"2. Considerably more production with a labor force of 482 in 1928 than with one of 554 in 1917.

Calculation and Work Sheets for Planning Department

PART I

Form for the Selection of Simplified Expressions for the Economic Production Quantity or the Minimum Cost Quantity

Procedure (obtain data from Table 1)	This space is to be used for computations
Item 1 Divide v by i and multiply by $2/h$..... $= \frac{\cdots}{\cdots} \times \frac{2}{\cdots} = \cdots$ Item 1 is a constant for all problems in a given plant and need be calculated but once	
Item 2 Divide B by c'.. $= \frac{\cdots}{\cdots} = \cdots$	
Item 3 Multiply item 1 by item 2..... $= \cdots \times \cdots = \cdots = \cdots \quad R_v$	
Item 4 Subtract kp/D from $(1/Ya)$..... $= \frac{1}{\cdots} - \frac{\cdots}{\cdots} = \cdots$ where $kp = 0$ for non-continuous production; $kp = 1$ for semi-continuous production; $kp = (1 - 1/n)$ for batch production (See text pages for references, and see note 1 below.)	
Item 5 Divide t by item 4 $= \frac{\cdots}{\cdots} = \cdots$	
Item 6 Divide m by c' and add one..... $= \frac{\cdots}{\cdots} + 1 = \cdots$	
Item 7 Multiply item 5 by item 6..... $= \cdots \times \cdots \quad \cdots = \cdots = R_w$	
Item 8 (A constant for all problems).....	$1.0 = R_s$
Item 9 Add item 3, item 7, and item 8..... $= \cdots + \cdots + 1 = \cdots = R_c$	

Item 10 (*a*) Select, by inspection, any one (or two if necessary) of the index ratios (items 3, 7, or 8) so that the total value of those selected will be at least ⅔ the value of the index ratio R_c (item 9).

(*b*) Check off here the index ratios selected R_v ( ), R_w ( ), R_s ( ).

Item 11 *The Simplified Form*

Place in the denominator of the simplified form the following expressions according to the index ratios checked above

If R_v is chosen, use $\frac{v.B}{h} \cdot \left[1 - \frac{Ya}{D}\left(1 - \frac{1}{n}\right)\right]$

If R_w is chosen, use $\left(\frac{m + c'}{2}\right) .Ya.t.i$

If R_s is chosen, use $\frac{c'.i}{2}\left[1 - \frac{Ya}{D}\left(1 - \frac{1}{n}\right)\right]$

So that the economic production quantity..... $= \sqrt{\frac{F.\,Ya}{(?) + (?) + (?)}}$

where F = the total preparation charges in dollars.

[1] If item 4 $\times$ Y_a = 0.9 or greater, omit the parenthesis $1 - \frac{Y_a}{D}\left(1 - \frac{1}{n}\right)$ from any element where it may appear.

PART II

(Optional) Form for Determining the Value of the Problem Index and the Allowable Variation for Simplified Expressions

(Using values for items given in Part I and data from Table 4)

Procedure	This space to be used for computations
Item 12 Divide item 7 by item 9.... $= \frac{\cdots}{\cdots}$	$= \cdots$
Item 13 Divide c' by F..... $= \frac{\cdots}{\cdots}$	$= \cdots$
Item 14 Multiply item 12 by item 13... $= \cdots \times \cdots$	$= \cdots$
Item 15 Multiply i by t by item 6 by 2 $= \cdots \times \cdots \times \cdots \times 2$	$= \cdots$
Item 16 Divide item 14 by item 15..... $= \frac{\cdots}{\cdots}$	$= \cdots$
Item 17 Find square root of item 16..... $= \sqrt{\cdots}$	$= \cdots$
Item 18 Add one to item 17..... $= 1 + \cdots$	$= \cdots = K_o$
Item 19 (Refer to the figure in Table 4) Select curve in right-hand portion of chart for an allowable per cent increase λ_d in unit cost over the minimum cost and locate point on bottom scale below point of intersection of the appropriate curve for λ_d with the horizontal line drawn through the value of K_o (item 18) on the vertical scale. Read off the decimal figure for this point, which will be the value for the form index..	$= \cdots = e$
The value obtained from item 19 may be used in place of the ratio ⅔ employed in item 10 (Part I) for selecting the appropriate simplified expression, if greater accuracy is desired, or	
Item 20 Multiply item 9 by item 19... $= \cdots \times \cdots$	$= \cdots = R$
Item 21 Then, turning to Part 1, select the index ratio (or any group of two) which has a value greater than that for R given in item 20 and check these off in the appropriate spaces provided in section *b* of item 10. The appropriate simplified form will be obtained as usual from item 11.	
Item 22 Referring again to the chart, read off the values of the maximum limit of variation in production quantities.....	$= \cdots = E_m$
the minimum limit of variation in production quantities.....	$= \cdots = E_m$
which lie directly below the points of intersection of the curves representing λ_d to the right and left, respectively, with the horizontal line through K_o = (item 18).	

"3. Planning department supervision of production at reasonable cost.

"4. Increase in application of mechanical handling of materials.

"5. A reduction of 21½ per cent in raw material inventory.

"6. An increase in turnover of finished stock account from 3 2/3 times per year to 4 1/3 times."

The forum discussion that followed developed some really constructive ideas. For example, it was learned that several engineers have designed slide rules for rapid handling of their formulas. Another bit of information was that a number of large industrial concerns have adopted some management formulas at least in part.

Benjamin Cooper suggested the use of constants for each of the manufacturing departments and urged the adoption of a correction factor which would temper the mathematical result with an experience factor.

Sanford A. Moss stressed the need for simplicity at the inception of this new idea. He thought that on this count Professor Raymond's paper was too involved.

W. L. Jones said that there were too many formulas, and that a good deal of simplification is essential. He

with other speakers recommended slide rule calculations.

Gordon Pennington urged simplification of formulas and cited the limitations and hazards involved in using empirical equations.

He advocated the use of a simple formula when the selling price is about 10 times the preparation charge, and suggested the use of an experience factor when the selling price is 100 times the preparation charge.

His formula for the first condition is

$$L = \sqrt{\frac{2\ AD}{KB}}$$

where L = lot size
A = preparation charge in dollars
D = demand in prices per year
B = unit cost in dollars
K = sum of interest, obsolescence, deterioration and storage charges, expressed as a decimal.

Finally, he recommends the elimination of the minimum cost quantity as a further step in simplification.

Professor Raymond concluded the discussion by answering some of the questions and criticisms that had been advanced. First, he cited the fact that there are in existence about 25 or 30 formulas, which is confusing to say the least. His object was to derive a fundamental formula taking all variables into account and thus crystallize a basic starting point. Then simplification can begin along the lines of his present paper. He undoubtedly struck a sympathetic chord when he said that formulas can be safely used when all their factors are known and clearly defined.

"Of course," agreed the professor, "there are conditions which may necessitate a departure from the formula. Some of these are rush shipments, changes in schedule, special models, etc., but these are always problems in which the production man will have to exercise his own good judgment."

Relay Motors Enters Bus Field

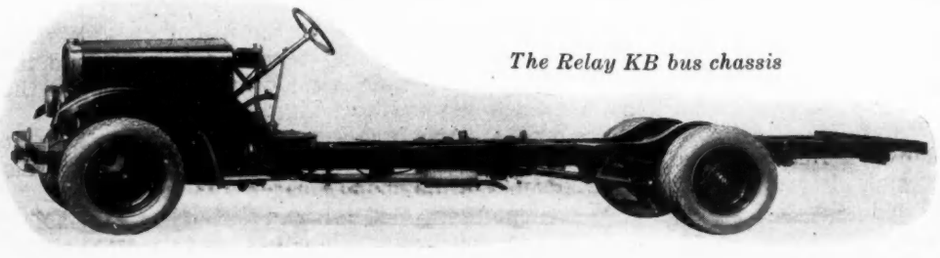
THE Relay Motors Corporation of Lima, Ohio. which heretofore has produced only trucks, has now entered the bus field and brought out a bus chassis of 180 in. wheelbase and fitted with the Relay drive axle designed to protect the chassis against road shocks. In the Relay axle the weight of the chassis is supported by the wheels on what amounts to a pendulum, with the result that if the wheel meets with a road obstruction the pendulum, and with it the chassis weight supported by it, swings through an angle and thus is raised gradually, whereby the blow is cushioned.

The Relay KB bus chassis is equipped with a six-cylinder engine of 3⅝ in. bore and 5 in. stroke, giving it a displacement of 309.6 cu. in. The engine is built in a unit with the multiple disk-type clutch and the four-speed transmission. The propeller shaft embodies three universal joints of the all-metal type. Spiral bevel gear drive is used for the primary reduction in the Relay-drive-type rear axle, with an internal gear secondary reduction at the wheels. Each wheel is fitted with two bearings, and any side thrust on it is not transmitted to the differential gear. The rear axle reduction ratio is 5.14.

Two entirely independent braking systems are provided, a four-wheel internal hydraulic system of service brake, and a hand-operated emergency brake acting on a drum on the propeller shaft. All springs are semi-elliptic, with all leaves made of alloy steel and the eyes of the master leaves bronze-bushed. Tubular radius rods are fitted. The steering gear is of the screw and lever type, with 18-in. handwheel and with its column supported in a rubber cushion.

The frame has channel side members of 7 by 2¼ by ¼ in. section. It is arched over both front and rear axles. Spoked metal wheels are used at both front and rear. Tire equipment consists of 32 by 6 in. pneumatics, single in front and dual in the rear. The tread is 58 in. at the front and 63 in. at the rear.

From a 30-gal. gasoline tank at the side of the frame the fuel is fed to the carburetor by means of a vacuum tank under the hood, this tank incorporating a strainer. A complete electrical equipment is provided and other equipment includes the following items: Speedometer, heater valve, oil pressure gage, gasoline gage, dummy dash for driveaway purposes, front crown fenders, extra rim, front and rear bumper, outriggers, jack, grease gun and full set of tools.



The Relay KB bus chassis

Trends in Design

(Correction)

IN our recent review of tendencies in passenger car design the statement was made that with the adoption by Packard of a carburetor manufactured by the Detroit Lubricator Co. the last of the car manufacturers had discontinued manufacturing its carburetor itself. This was incorrect, as the Cadillac Motor Car Co. manufactures its own carburetor. The explanation given of the action of the automatic heat control valve in the Cadillac powerplant also was inaccurate. This valve is located in the exhaust manifold of the left-hand bank of cylinders a short distance ahead of the point where that manifold joins the one from the right-hand bank of cylinders in a Y, at the forward end of the engine. Normally the valve is held closed by gravity, and the exhaust from the left-hand bank of cylinders then is compelled to pass through the inlet header jacket and thence to the exhaust manifold of the right-hand bank. At higher engine speeds the increased pressure behind the exhaust from the left-hand bank of cylinders forces the valve open against the force of gravity, allowing most of these gases to escape directly without passing through the inlet header jacket.

Front-Wheel Drive Has Advantages in Riding *Comfort and Safety*

Reduction of unsprung weight and higher speeds in turning add to favor of the design. Problems remain in rearrangement of front axle and engine accessories.

By P. M. HELDT*

FOR many years past there has been a tendency to lower the center of gravity of passenger vehicles, to increase their stability at high speeds. Underslung springs, double-drop frames, small-diameter wheels and other expedients were resorted to in order to bring the frame and the body floor closer to the ground. Finally interference of the floor of the passenger compartment with the propeller shaft set a limit to this development. In Europe a good many small cars are being built with a so-called tunnel for the propeller shaft at the middle of the floor in the passenger compartment, but this has never found favor with American designers.

The demand for still lower floors than permissible with the ordinary spiral bevel gear drive led to the development of the hypoid gear drive and to the reintroduction in this country of worm gear drive, undermounted, for passenger cars. With both of these drives the rear end of the propeller shaft is below the level of the rear axle axis, and the body floor can be further lowered without interference with the propeller shaft. The front drive possesses certain other advantages, but there can be little doubt that the chief motive behind the movement toward front drive for passenger cars that set in about two years ago was the desire to place the body floor lower than was practical with a propeller shaft to the rear.

With rear-wheel drive and a powerplant located at the forward end of the car the differential and the final reduction gear are usually incorporated in the rear axle. In recent years some European designers have broken away from this practice by mounting the differential and driving gear on the chassis frame and driving the wheels through shafts capable of swinging in a plane perpendicular to the chassis frame.

With front drive and a powerplant located at the forward end of the car the drive conditions are rather different. Usually the engine, clutch, transmission and final drive gear are combined in one unit or block. The axis of the final drive gear must lie in the vertical plane through the steering pivot axes (or at least close to it). It is evidently possible to have the engine either forward or back of the driving gear, but for passenger cars the only practical arrangement would seem to be to have it back of the axle, as this results in a car of the general form which has become standardized to a high degree.

The difficulties of the designer were increased by the fact that the advent of front-wheel drive for passenger cars occurred during a period when the vertical type of eight-cylinder engine enjoyed great popularity and four-speed transmissions were gaining in favor, for one of the greatest problems connected with the development of a front-drive car is that of keeping down the length of the hood required to cover the powerplant. With the length of body space fixed, any addition to the distance between front axle and dash calls for an increase in the wheelbase. Abnormally long wheelbases are undesirable because they add to the necessary frame weight, and also because they reduce the maneuverability of the vehicle—an important factor in these days of traffic congestion.

When a lowering of the car frame and floor is considered, the problem of ground clearance arises. A certain amount of ground clearance is needed with any car in order that its lowest parts may not hit projections above the road surface. It is a matter of some importance, however, where the lowest point of the chassis is located, and from this point of view the front-drive car has a certain advantage. This is illustrated by the sketches in Fig. 1. Usually the lowest point of the chassis is the bottom of the flywheel housing. Conditions with respect to road clearance may become critical when a car — and particularly one with long wheelbase—passes over the brow of a hill. In a rear-driven car with multi-cylinder vertical engine the flywheel housing is not far from midway between the front and rear wheels, and if the top of the hill is sufficiently sharp the clearance may be entirely taken up. In a front-driven car, on

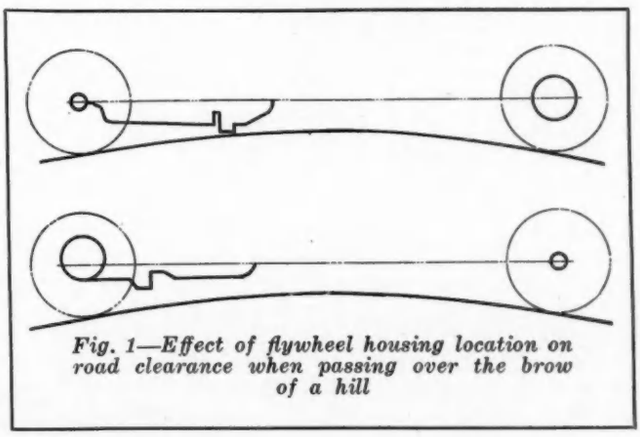


Fig. 1—Effect of flywheel housing location on road clearance when passing over the brow of a hill

*This article is an abstract of Mr. Heldt's paper which was read before the New England Section, S.A.E., in Boston last week.

the other hand, the flywheel housing is much nearer the front axle and the clearance is not affected so much.

Another important advantage of front drive is that it improves the riding qualities of a car. In making this comparison with rear drive I wish to emphasize that it is between two cars which are alike in every other respect except the location of the drive. The reason for the improvement in riding qualities with the adoption of front drive is that the unsprung weight is reduced. Riding comfort is affected most by the rear axle, as the rear seat is almost directly over it. A plain dead axle naturally can be made to weigh much less than a live axle comprising separate carrying and driving members together with a differential. In order to reduce the weight to a minimum, the rear axle in one case was made of thin-walled heat-treated chrome-molybdenum tubing, which is used largely for airplane structures. However, whether this will come to be generally used for the purpose is questionable, for one reason because the thin-walled tube deforms easily if a jack is applied to it. But even with ordinary seamless steel tubing or a drop-forged I-section rear axle the weight is much less than that of a live axle of equal capacity.

Spring-Mounted Differential

This reduction in the unsprung weight at the rear is not accompanied by a similar increase in unsprung weight in front, for the differential and driving gear which are removed from the rear axle are not placed on the front axle but mounted on the chassis frame, and therefore are spring-suspended. Moreover, the front brakes can be removed from the wheels and located on opposite sides of the driving gear housing, thereby making their weight sprung weight.

A further advantage of the front drive is that vehicles equipped with it are less inclined to skid at turns.

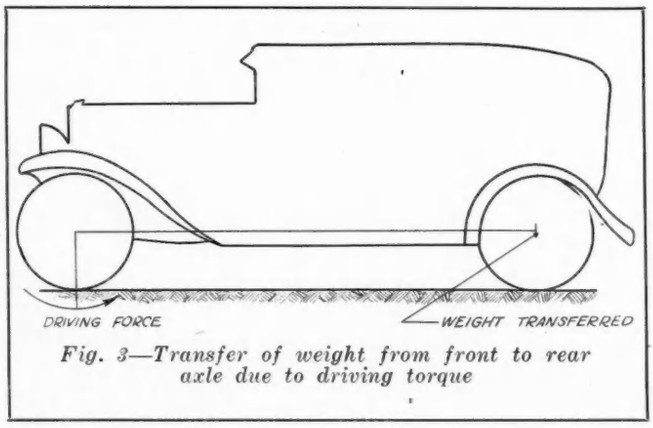


Fig. 3—Transfer of weight from front to rear axle due to driving torque

That this holds true in practice is borne out by the testimony of those who have had experience with front-drive cars on the Indianapolis Speedway. The reason for the better road-holding ability of the front-drive vehicle on turns is probably that in making a turn under power, the rear wheels will run with less slippage if they are not driven than when they are being driven, hence they have greater power to hold the vehicle to its course in the case of a front-drive car. The lesser unsprung weight on the rear wheels also tends to make them hold the road better and to prevent skidding.

Front-drive cars can be built either with or without a rigid front axle. American firms that have gone in for front drive so far have adopted the rigid axle, while European firms usually employ independent suspension.

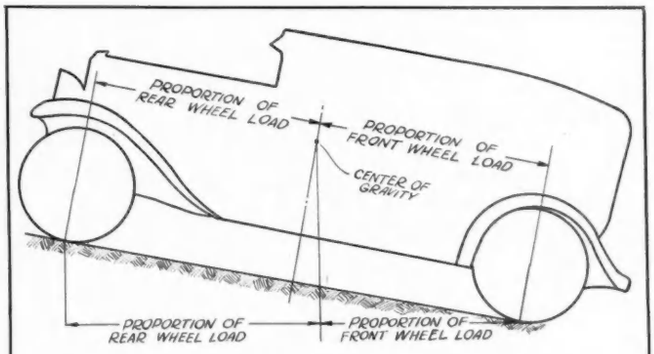

PROPORTION OF REAR WHEEL LOAD
PROPORTION OF FRONT WHEEL LOAD
CENTER OF GRAVITY
PROPORTION OF REAR WHEEL LOAD
PROPORTION OF FRONT WHEEL LOAD

Fig. 2—Transfer of weight from front to rear axle due to an up-grade

The steering heads or axle ends may be carried at the ends of leaf springs or links extending sideways from the driving gear housing, or the steering knuckles may be arranged to slide on vertical studs secured to the chassis frame or body, being cushioned on coiled springs. If a rigid axle center is to be used, it is, of course, impossible to carry it straight across from steering head to steering head, as the drive gear housing interferes. The axle can be cranked or curved to pass over, under or in front of the drive gear housing, and two of these three possible solutions of the problem have been embodied in American front-drive cars.

One point that deserves particular attention in connection with front-drive vehicles is a proper division of load between the front and rear wheels. It is well known that the maximum traction which is available in a motor vehicle is directly proportional to the weight on its driving wheels. For this reason, for vehicles which must operate under particularly unfavorable traction conditions (Ordnance Department trucks, etc.), the four-wheel drive is chosen. In ordinary commercial trucks the designers aim to get at least 80 per cent of the total weight on the rear driving wheels under conditions of full load. In passenger cars lack of sufficient load on the traction wheels has not caused any difficulty in the past.

Transfer of Front Axle Load

But conditions affecting the limiting traction are rather more favorable with the rear-wheel than with the front-wheel drive. In a normal passenger car when loaded the weight on the driving wheels is usually materially greater than that on the front steering wheels. On an upgrade, where more traction is required, additional weight is transferred to the drivers in the case of the rear-drive car, while in the case of the front-drive car some of the weight is removed from the drivers by the inclination of the vehicle. Moreover, the reaction to the driving-wheel torque also adds to the weight on the drive wheels in the case of rear drive and subtracts from it in the case of front drive. It is therefore plain that with the same weight distribution and the same tire treads and road surfaces, the maximum traction is greater in a rear-drive than in a front-drive car.

The two conditions of weight transfer by an up-grade and by driving torque, are illustrated diagrammatically in Figs. 2 and 3. The weight of the car and load may be considered concentrated at the center of gravity, and the distribution of weight between front and rear wheels is then in inverse proportion to the horizontal distances between the center of gravity and the points of ground contact of the front and rear wheels respectively.

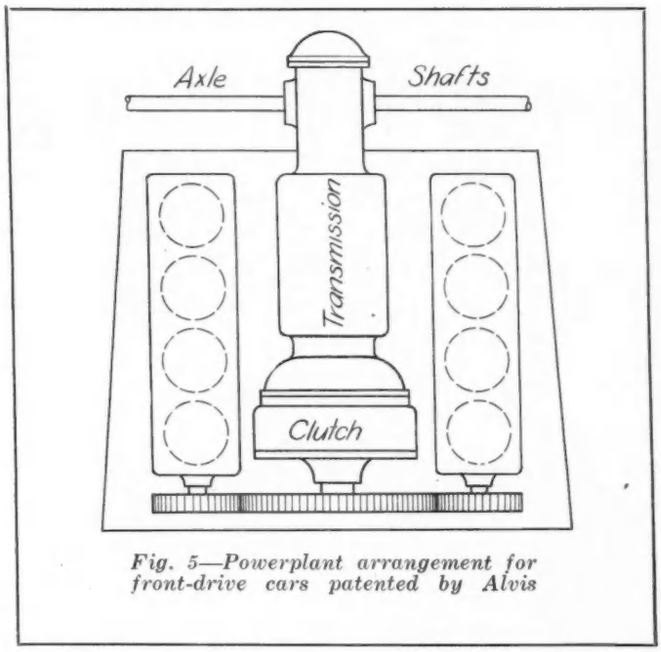


Fig. 5—Powerplant arrangement for front-drive cars patented by Alvis

In Fig. 2 the proportions are so chosen that the center of gravity is midway between the points of ground contact of the front and rear wheels when the car stands on the level. On a 30 per cent grade, as here shown, the vertical line through the center of gravity is much closer to the point of ground contact of the rear wheels than that of the front wheels.

In Fig. 3 the circumferential force on the front driving wheel is represented by a circular arc with arrowhead. When the front driving wheels are developing a certain torque, the chassis frame is subjected to an equal torque in the reverse direction, referred to as the torque reaction. The effect of this reaction is to press the rear wheels more forcibly against the ground, or, in other words, to add to the load on these wheels.

Front Drive Bus

This difference in the limiting traction is of no consequence under ordinary driving conditions on hard-surfaced, dry roads, as there is then sufficient traction to meet requirements in both cases. Probably the characteristic referred to assumes its greatest importance when considering starts from traffic stops on greasy pavements. The actual importance of the matter can be determined only by experience. It is hardly necessary to say that front-drive designers are not constrained to use the same weight distribution as is customary in rear-wheel drive cars. Moreover, the transfer of weight due to torque reaction is considerable only when accelerating on low gear. Lengthening of the wheelbase decreases it, and long wheelbases are natural in connection with front drives.

In motor trucks and motor buses with front-wheel drive, in order to obtain a more favorable distribution of weight between front and rear wheels and a higher limiting torque, it is customary to place the powerplant in front of the front axle. An example of this is the bus of the Berlin General Omnibus Co. shown in Fig. 4. This has the incidental advantage that it makes the powerplant more accessible for repairs and replacement. For passenger cars this arrangement would hardly be considered, by reason of the effect on the general appearance. But front-drive passenger car designers already have taken steps to obtain a more favorable distribution of weight. In the Ruxton the final drive gear is placed at the center of the transmission housing, thus moving the whole powerplant forward about 8 in. and in both the Cord and Ruxton the storage battery is located under the hood, instead of under the front floorboards.

In England a patent has been taken out by the Alvis Motor Car & Engineering Co. on a front-drive car design in which two four-cylinder engines are placed side by side, and the drive is taken from their rear end to the front axle, as shown in Fig. 5.

Location of Front Brakes

It has been pointed out already that with front wheel drives it is unnecessary to carry the front brakes on the wheels. Their drums can be mounted on the short shafts of the differential side gears, as in the Cord.

Adoption of front drive confronts the automobile designer with a number of new problems, chief among which is probably the design of the front axle together with knuckles and driving members. The transmission line between each differential side gear and the road wheel on the same side is in three parts—a short shaft fastened into the side gear, a short shaft fastened to the driving wheel and passing through the hollow knuckle spindle, and a longer shaft between these two and connecting to them by universal joints. These universal joints must compensate for two kinds of relative motion between the differential and the driving wheels, the motion due to spring play, and that due to deflection of the driving wheels for steering.

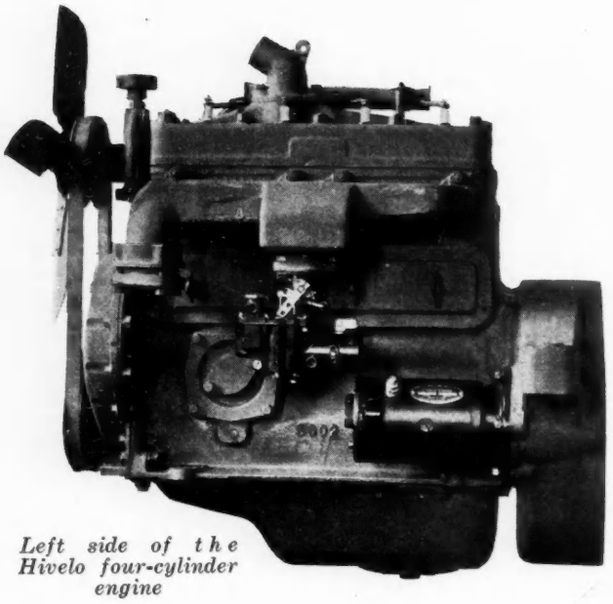
When the front wheel is deflected from the straight-ahead course, the angle of the joint at the steering knuckle changes, while that of the joint at the differential does not. It is therefore at least desirable to use at the knuckle either a universal joint of a type which transmits motion uniformly at all angles, or else two yoke-type universals placed close together and so arranged that the angles of both are always equal. The center point of the universal joint assembly at the knuckle should lie in the axis of the knuckle pin, for obvious reasons.

The axle end or steering head must be of such design that it does not interfere with the driveshaft. If it is of yoke form the yoke, instead of being in the trans-

(Continued on page 906)

Fig. 4—Berlin front-drive bus with powerplant mounted in front of driving axle

Buda Produces Series of High Speed



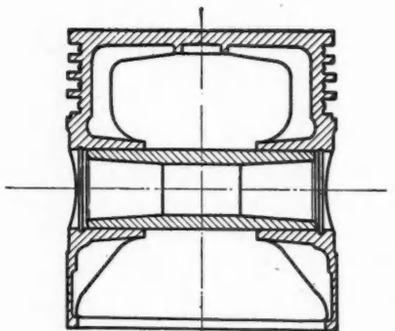
Left side of the Hivelo four-cylinder engine

Six and four-cylinder models, have power peaks at 3000 with variable pitch

By M. WARREN

A NEW series of high velocity, high duty engines for the commercial car field, including three groups and five models, is offered by the Buda Co., of Harvey, Ill. The new line is to be known as the "Hivelo" series.

As the name indicates, high velocities have been utilized wherever possible throughout the design. Power peaks are reached at 3000 r.p.m., and cooling is accomplished through comparatively small water volume, pumped through the cooling system at high velocities. Large supplies of oil, pumped in great quantity at high speed, and high speed valves, fitted with variable pitch springs, are among other important features.



Detail of the Hivelo piston pin lock

Three sizes of sixes and two of fours are included in the series. Models H-260 and H-298, the larger sixes, have a stroke of 4½ in. and bores of 3½ and 3¾ respectively, giving piston displacement of 259.9 and 298.2 cu. in. Model H-260 develops 75 b.hp. at 3000 r.p.m., while Model H-298, the larger of the six series, develops 86 b.hp. at 3000 r.p.m.

The smaller six, the Model J-214, develops 61.5 b.hp. at 3000 r.p.m. This engine has a bore and stroke of 3⅜ x 4, giving a piston displacement of 214.7 cu. in.

The four-cylinder engines have the following dimensions: Model H-173, bore and stroke, 3½ x 4½ in., giving a piston displacement of 173.2 cu. in. and develops 49.5 b.hp. at 3000 r.p.m.; Model H-199, bore and stroke, 3¾ x 4½, giving piston displacement of 198.8 cu. in. and develops 57 b.hp. at 3000 r.p.m.

Maximum torques, with the speed at which they are obtained, are as follows:

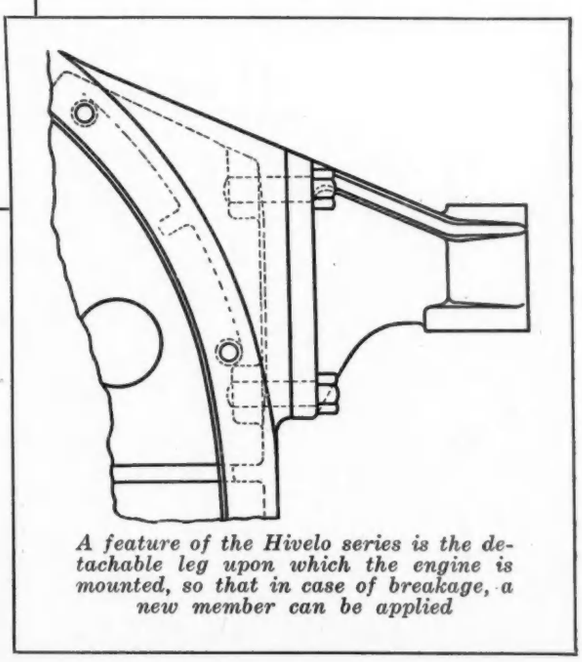
Model H-173—108 ft.-lb. at 1000 r.p.m.
Model H-199—125 ft.-lb. at 1000 r.p.m.
Model J-214—135 ft.-lb. at 1000 r.p.m.
Model H-260—162 ft.-lb. at 1000 r.p.m.
Model H-298—186 ft.-lb. at 1000 r.p.m.

The entire series of Buda "Hivelo" engines has been designed to further the interchangeability of parts, and to allow users of any model the economies resultant from the series as a whole. So far as appearances and accessories are concerned, the three groups are identical.

Both the two large sixes and the two fours are equipped with crankshafts of 3 in. diameter. Main bearing lengths also are the same in these two groups. The six-cylinder engines are built with seven main bearings, while the "fours" have five.

Main bearing lengths in these two groups are: front, 1½ in.; intermediates, 1 1/16 in.; center, 2 in., and rear, 2⅛ in.

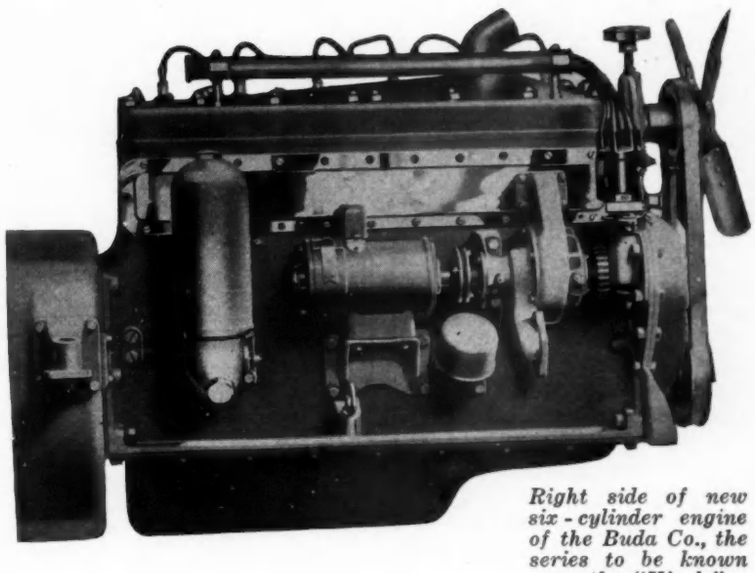
The camshaft bearings, which number four on the sixes and three on the fours, likewise are interchangeable between the two series of fours and sixes. Diameter



A feature of the Hivelo series is the detachable leg upon which the engine is mounted, so that in case of breakage, a new member can be applied

Engines for Commercial Vehicles

to be known as "Hivelo," will r.p.m. Alloy steel valves springs are features.



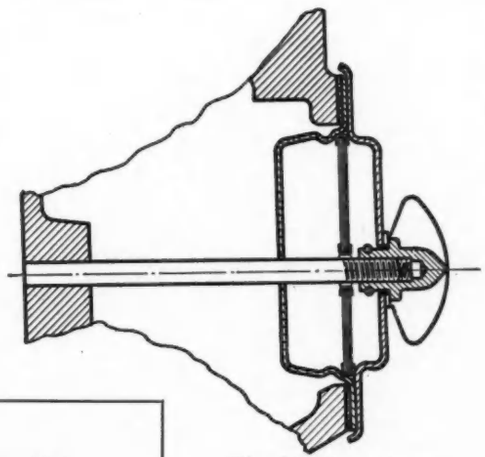
Right side of new six-cylinder engine of the Buda Co., the series to be known as the "Hivelo"

BAKER

is 2⅛ in., except the rear, which is 1½ in., in both groups, and lengths, front to rear, are 1⅜ in., 1 in., 1 in. and 1 1/16 in. on H-260 and H-298. Lengths on H-173 and H-199 are 1⅜ in., 1 in. and 1 1/16 in. Connecting rods and piston pins also are interchangeable throughout all four models of these two groups.

Rods are I-beam sections and have a center-to-center length of 9½ in. Rod bearings are 2.125 in. in diameter and 1.625 in. long. Piston pin bearings have a diameter of 1⅛ in. and have lengths as follows: H-260 and H-173, 2 13/16 in.; H-298 and H-199, 3/16 in. Valves also are interchangeable in these two groups. The exhaust valves, of silchrome steel, have a clear diameter of 1⅜ in., while the inlets, of chrome-nickel steel, having a diameter of 1½ in. Pistons are of the same length, 3¾ in. and are interchangeable between the fours and sixes of equal bore. Pistons are fitted with four rings, all above the pin, the lower of which is of the oil control type.

The Model J-214 six-cylinder engine has a seven-bearing crankshaft of 2½ in. diameter and the following lengths: front, 1⅜ in.; four intermediates, 15/16 in.; center, 1¾ in., and rear, 1⅞ in. The camshaft bearing has a diameter of 2 in. except the rear, which is 1½ in., and lengths, front to rear, 1 7/32 in., 1 in., 1 in. and 1 in. I-beam section connecting rods are 8½ in. center-to-center and the lower rod bearings are 2 in. in diameter and 1½ in. long. Piston pin bearings are 1 in. in diameter and 2 11/16 in. long. Pistons are of the same length, 3¾ in. and cast of the same material as those in the other four models, gray iron of light weight.

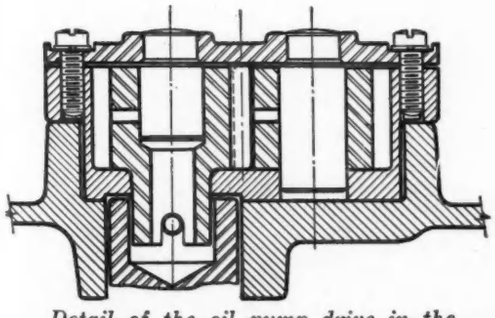


The Hivelo series has a built-in air cleaner screen

All three groups of engines are designed for a modified three-point mounting in the chassis and all are equipped with safety legs on the bell housing, so that in case of great shock, the removable legs will break rather than the housing.

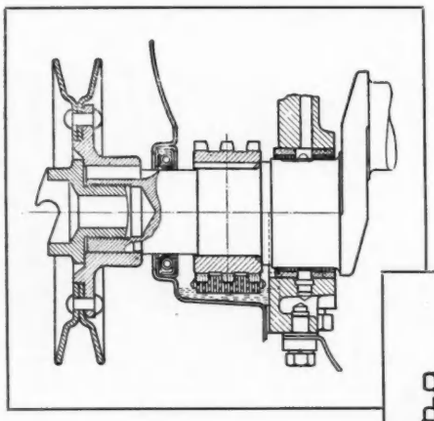
Both the sixes and the fours are equipped for battery ignition. Spark plug holes are threaded for metric plugs, and S.A.E. 1-in., 1¼-in. and 1½-in. carburetor flanges are supplied on the three different size engines, respectively.

One of the outstanding features of the entire three groups of engines is the use of short, heavy, large diameter crankshaft. Although the main bearings are short, the larger diameter allows the same projected bearing area as usual and in addition the shortness and sturdiness of the shaft reduces the tendency to torsional vibration. Additional stiffening of the shafting structure is credited to the fact that the crank pins overlap the area of the mains.



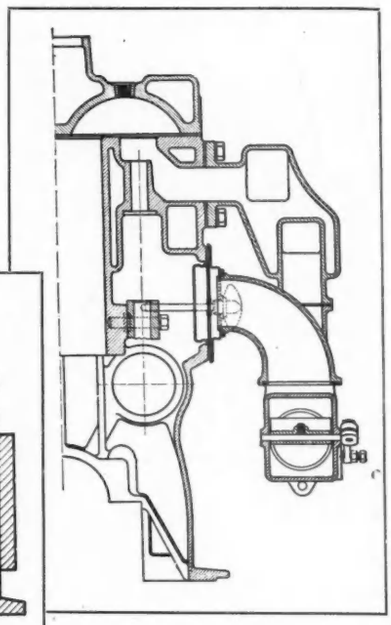
Detail of the oil pump drive in the Hivelo series powerplant

A number of refinements in this class of engine are

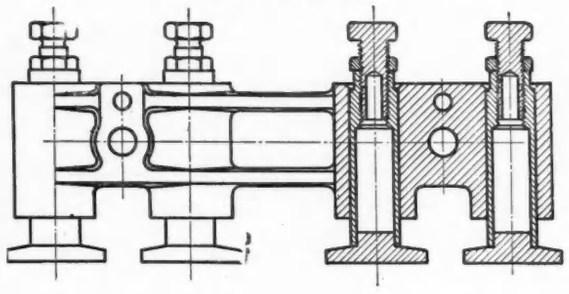


Sectioned plan of the crankcase pool (left)

The Buda Hivelo features an auxiliary hot air supply, the plan of which is shown at the right



Tappet bracket assembly of the new Buda Hivelo series engine



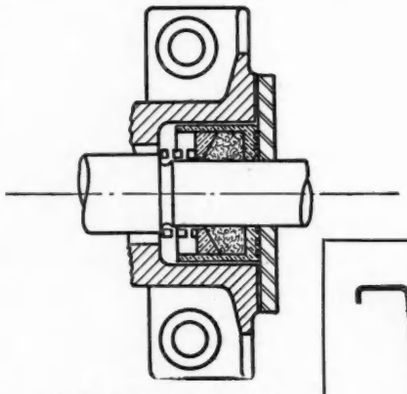
apparent. A built-in air cleaner that is also a crankcase ventilating system is one of the most important. The valve cover plate is constructed with screened louvers at the forward end and is built in two plate sections, the inner half of which is provided with dust interceptor screens and acts as a baffle plate provided with several holes to allow ingress of gas, water vapor and oil vapor from the crankcase. The rear section of the cover plate is connected with the carburetor air intake, which thus draws off all such vapors and mixes them with the atomized gasoline being drawn into the cylinders. Thus the air is taken in through the louvers, passes the length of the cover plate, picking up all vapors from the crankcase en route, and thence into the carburetor.

Oil is supplied to the entire system by a large capacity geared pump and all lubrication; passages are rifle drilled, even to the main feed line in the crankcase, which is drilled the full length of the casting. Crankshafts and connecting rods likewise are drilled for oil. There are no loose pipes and all danger from pipe breakage is obviated.

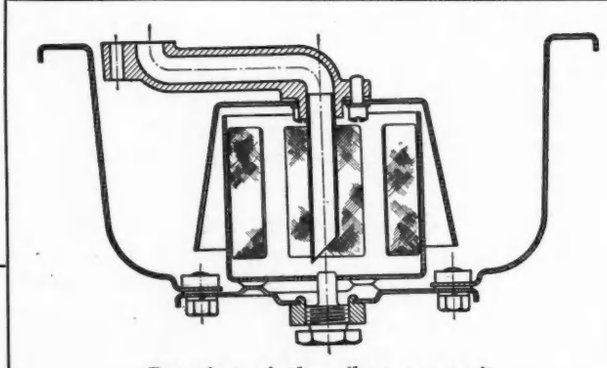
Provision is made for standard oil filtering systems. The oil screen is inclosed in a vacuum cap, insuring the oil passing through the screen, or if it is too cold and the oil too stiff to pass through the mesh, it will pile up on top of the screen and insure the pump getting its supply. The oil pan is provided with a plug for occasional drainage. The front end assembly is lubricated through a hollow shaft with discharge holes in the rim of the gears or sprockets, whichever the customer wishes supplied. An oil pool also is supplied under the crankshaft gear or sprocket.

Water jacketing is reduced to the minimum with a view to bringing the engine to the proper operating temperature as quickly as possible. The capacity and speed of the water pump is relied upon to dissipate the excess heat caused by the smaller jacket volume.

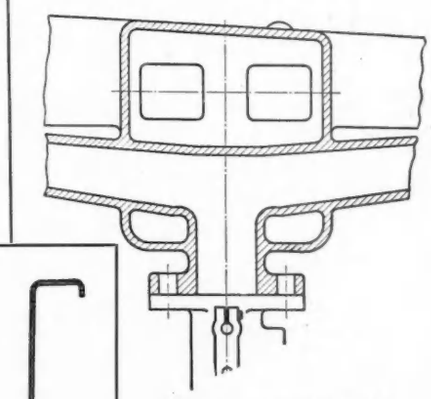
Water pumps are of a new design. The combustion chamber is of the high turbulence type. Provision is made in the block for mounting any standard fuel pump.



The water pump is stop-scaled as shown above



Drawing of the oil screen unit



The arrangement of the manifold hot spot is indicated in the drawing at the right

Drilling and Turning Fundamentals Developed in *A. S. M. E. Paper*

Advance in knowledge in field is marked by authors of high speed, shallow cut study given at 50th Annual Meeting.

ADVANCE in the knowledge concerning certain fundamentals underlying the drilling and turning of cast iron and steel was marked by the presentation of two important papers at the Fiftieth Annual Meeting of the A.S.M.E. "Turning with Shallow Cuts at High Speeds," by H. J. French, International Nickel Company, and T. G. Digges, associate metallurgist, U. S. Bureau of Standards, crystallized the results of a study dealing with the relation of tool life and performance and variables such as depth of cut, speed, shape of tool, and high-speed-steels of various compositions.

In opening, the paper offers a new method of testing lathe tools. The authors have designed a special tool holder, Fig. 1, which carries two tools set parallel to each other and adjusted for equal depths so that the "trailer" or following tool will not cut until the "leader" or cutting tool fails. With this method, then, failure of the cutting tool is reckoned from the time that the "trailer" picks up a measurable cut. Throughout the tests, "critical cutting speed" is defined a sthe highest speed, V (ft. per min.) at which the tools would cut for 90 min. without failure.

"The results of tests at different cutting speeds with a feed of 0.0115 in. per revolution and depths of 0.010 or 0.020 in.," say the authors, "show that there was a continuous increase in the life of high-speed-steel tools as the cutting speed was decreased. Within a life range of from 2 to 125 min. the experimental results may be represented by the equation

$$V\,T^n = c \qquad \ldots\ldots\ldots\ldots\ldots\ldots (1)$$

in which V is the cutting speed in ft. per min., T the tool life in minutes, and n and c are constants. In one of the two sets of tests, the experimental results were most closely represented by Equation (1) when n was 1/10 while the best representation in the second set was obtained when n was 1/12.

"When taking shallow cuts with high-speed-steel tools, Ripper and Burley found that the relation between the cutting speed and tool life could be represented by Equation (1) with n equal to 1/12. They did not report the actual values of tool life, but a study of the points plotted in their charts showed that only in some cases were the relations between cutting speed and tool life best represented by Equation (1) with $n = 1/12$; in others, as good or better representation was obtained with $n = 1/10$. The value of the exponent n in Equation (1) cannot be definitely established at this time. The value 1/10 was selected for use in this investigation since it is closer than 1/12 to the exponent in a similar equation which Taylor demonstrated was applicable to conditions of rough turning."

For carbon tool steel the change from very short life to very long life was generally produced by decreases of less than 5 ft. per min. in cutting speed. The relations between the cutting speed for a given tool life, the feed, and depth of cut, in the case of high-speed-tools may be represented approximately by the equation

$$V = K_1 - K_2\,(D\,F)^{1/2} = K_1 - K_2\,A^{1/2} \qquad \ldots\ldots\ldots (2)$$

when V = cutting speed in ft. per min., D = depth of cut in inches, F = feed in in. per revolution, A = area of cut ($D\,F$) and K_1,and K_2 are constants. For carbon-steel tools this relation becomes

$$V = \frac{K}{\sqrt{D\,F}} = \frac{K}{\sqrt{A}} \qquad \ldots\ldots\ldots\ldots (3)$$

A comparison of these relations for high-speed-steel and carbon steel-tools is shown in Fig. 3.

The effect of cutting fluids on cutting speeds was next studied. The authors found that the most significant effect of a cutting fluid is to produce a better finish as compared with dry turning. As a result of a series of tests, dry, with water, and with lard oil it is concluded that for given speeds, feeds, and depth of cut Equation (1) becomes

$V\,T^{0.100} = 485$ for dry tests

$V\,T^{0.115} = 547$ for lard oil

$V\,T^{0.131} = 585$ for water

Heat treatment was found to be an important element in the life of high-speed-steels. For shallow cuts the favorable conditions appear to be about 2400 deg. Fahr. for quenching and 1100 deg. Fahr. for the subsequent tempering. Evidently this treatment improves toughness and tends

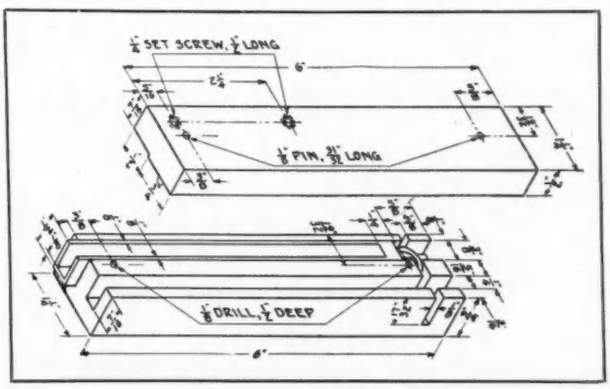


Fig. 1—Sketch showing details of the construction of the special tool holder

to increase tool life. Carbon-steel tools appear to be unaffected by variations in hardening temperatures between 1425 and 1650 deg. Fahr. Moreover, a subsequent tempering up to 375 deg. Fahr. showed no improvement over untempered tools.

As a result of their study of the effect of various elements added to high-speed steels, the authors conclude in part that "Of twelve elements added in different proportions to chromium-tungsten or chromium-tungsten-vanadium high-speed steels only one, cobalt, produced decidedly beneficial results. Molybdenum and nickel offered promise under certain conditions, while the remainder either had a negligible effect or were definitely deleterious from one viewpoint or another. Cobalt improved the performance of the high-speed-steel tools both under shallow cuts and under heavy duty, but the maximum benefits were obtained only with high hardening temperatures. The percentage gain from the addition of colbalt was somewhat greater

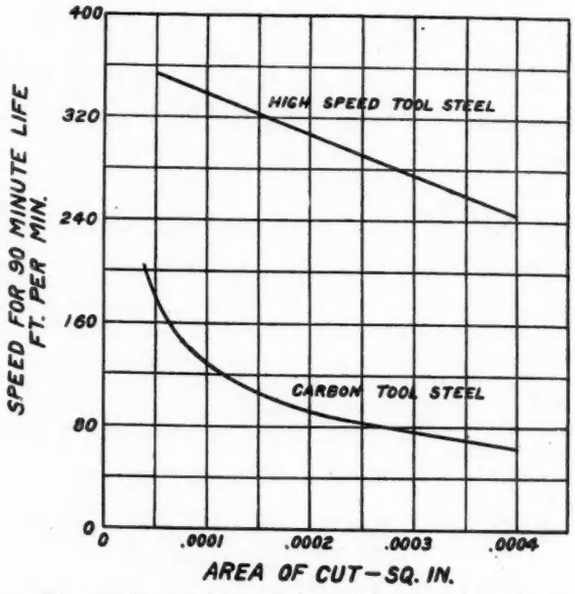


Fig. 3—Comparison of the cutting speeds of 1.3 per cent C and the high speed tools with different areas of cut

in rough turning than with shallow cuts and fine feeds, but increase in cobalt above about 5 per cent did not produce improvements commensurate with those resulting from 3.5 to 5 per cent and high hardening temperatures.

Replacement of part or all of the tungsten in high-speed steels by molybdenum, in the ratio of 1 part molybdenum to 2½ parts of tungsten, produced steels

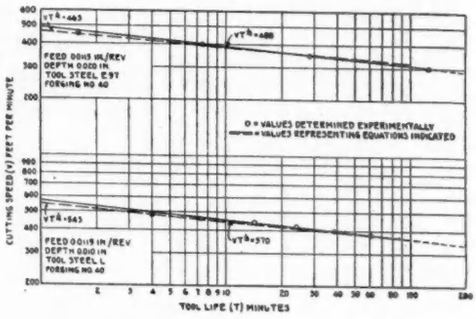

CUTTING SPEED (v) FEET PER MINUTE
TOOL LIFE (T) MINUTES
O = VALUES DETERMINED EXPERIMENTALLY
= VALUES REPRESENTING EQUATIONS INDICATED

Fig. 2—Relation between the cutting speed and the tool life under shallow cuts and fine feeds. (Tests made dry)

having performance comparable to that of the tungsten steels. Such substitution should be useful in case of a depleted tungsten supply, but is not advocated at the present time since there was some evidence of irregular performance in the high-molybdenum steels and their hot-working properties did not seem to be as good as those of the tungsten steels.

In opening the discussion, Prof. O. W. Boston suggested that the dynamometer tests used by the authors were not as conclusive or definite as they might be. He also questioned the use of a broad-nosed tool as being contrary to general practice. He recommended further study into the influence of depth of cut, amount of feed, and side and back slopes of the tool.

Mr. DeLeeuw inquired whether the authors had studied the effect of zirconium. Incidentally, he stressed the idea that although wear may occur at the side or top of the tool, the form at the top may not change and yet dullness may result.

Douglas Baker asked whether there would be any saving in costs by substituting molybdenum for tungsten.

Answering some of the queries, Mr. French said that the price of steel with molybdenum would be cheaper since the amount used is 1 part to 2½ parts of tungsten but that the actual difference in the cost of a tool would be small. The life of a cemented tungsten carbide tool is longer than that of the tools that were tested, he further stated.

Mr. Digges added that for cemented tungsten carbide tools, the exponent n, in the equations, would be larger although they had no information as to its actual value.

"Power Required to Drill Cast Iron and Steel," giving the latest information on the relation of torque, thrust and horsepower, in drilling cast iron and steels, was presented by the authors, O. W. Boston, professor, college of Engineering, University of Michigan, and C. J. Oxford, chief engineer, National Twist Drill and Tool Company. Tests were conducted on drills ranging in diameter from ½ in. to 1½ in. and drilling in two varieties of cast iron and 17 varieties of steel.

The work was divided into first, "Commercial Tests"

SUMMARY OF RESULTS OF THE COMMERCIAL DRILLING TESTS FOR ALL DRILL SIZES ON BAR 3 STEEL S.A.E. 2320

Drill size	R. p. m. Set-up	R. p. m. Factor	R. p. m. Actual	Feed, in. per rev.	Torque in ft.-lb.	Torque hp. = $\frac{0.0001904\ N\ T}{}$	Thrust in. lb.	Thrust hp. = $\frac{F\ T^h\ N}{12\times33{,}000}$	Total hp. output = hp. T + hp. T^h	Input net gross-tare Kw.	Input net gross-tare Hp.	Eff. = $\frac{\text{hp. (out)}}{\text{hp. (in)}}$
½	441	$\frac{633}{625}$	446	0.009	11.0	0.934	618.75	0.00627	0.9403	0.790	1.058	88.8
⅝	360	$\frac{639}{625}$	368	0.011	18.7	1.311	728.75	0.00745	1.3185	1.19	1.595	82.7
¾	296	$\frac{630}{625}$	298.3	0.012	27.7	1.574	1027.25	0.00928	1.5833	1.37	1.838	86.1
1	228	$\frac{624}{625}$	227.6	0.013	51.3	2.223	1615.6	0.01208	2.2351	2.07	2.774	80.6
1¼	178	$\frac{618}{625}$	176	0.015	86.1	2.883	2058.3	0.01372	2.9867	2.72	3.642	79.6
1½	153	$\frac{618}{625}$	151.2	0.015	118	3.40	2506.25	0.01434	3,543	3.254	4.36	81.3

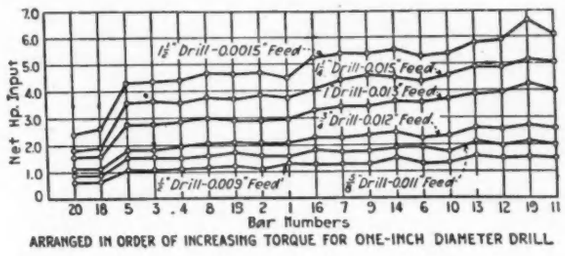


Fig. 5—Net hp. input values for each drill diameter and its commercial feed for all materials

run according to the manufacturers' recommendations, and "Special Tests" designed to study the effect of variables such as drill diameter, feed in in. per revolution, and the speed. Fig. 4 gives the results of "Commercial Tests" on one type of steel. An interesting relation is depicted in Fig. 5 which shows the power required to drill the various types of materials arranged in the order of increasing torque for a one-inch diameter drill.

In the "Special Tests," variable speed tests were run between 74 and 441 r.p.m. with a constant feed of 0.012 in. per revolution. Fig. 6 shows graphically the results for one of these. Feeds were varied between 0.006 in. and 0.019 in. per revolution at constant speed to study the relations of torque and thrust. The nature of these for one of their tests is shown in Fig. 7. Variable diameter tests were run at constant speed and constant feed in order to establish the effect of drill size on input horsepower. Fig. 8 shows the results of a typical test.

"In arriving at the following conclusions," the authors explained, "it is to be understood that the drills used were supposed at all times to have a keen cutting edge and point, that is, they were in a sharp condition. A cutting fluid consisting of one part of soluble oil mixed with sixteen parts of water was used on all tests. Actual experimental results are given in every instance,

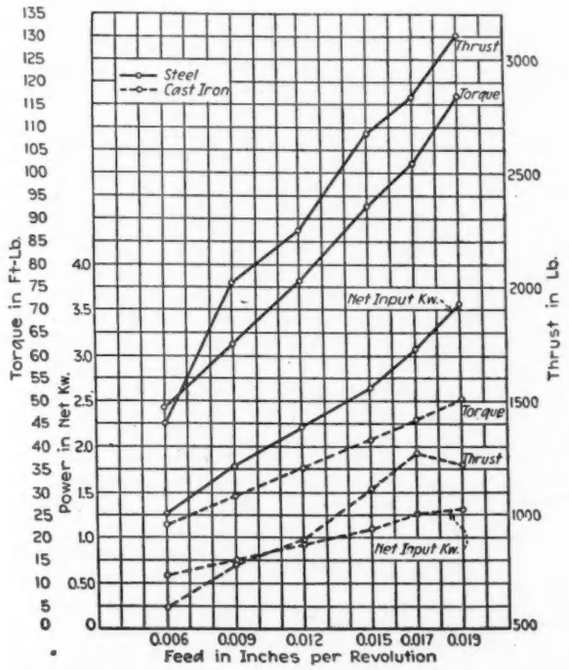


Fig. 7—Variable-feed tests showing torque, thrust and net-input kilowatts for steel bar 6 (0.15 per cent C) and cast iron bar 25 (20 per cent charcoal pig) with same speed and drill as Fig. 6

rather than values determined by smoothing out curves."

1. The torque remains practically constant at speeds ranging from 74 to 441 r.p.m. for both cast iron and steel and for various drill diameters when operating under constant conditions of feed, lubrication, and material.

2. The thrust remains practically constant at speeds ranging from 74 to 441 r.p.m. for both cast iron and steel and for various drill diameters when operating under constant conditions of feed, lubrication, and material.

3. The net input which equals the gross minus the load on the machine running idly, increases directly with the speed for the conditions mentioned under 1 and 2.

4. The torque increases with the feed, but at a slower rate for a constant drill diameter and speed. For two

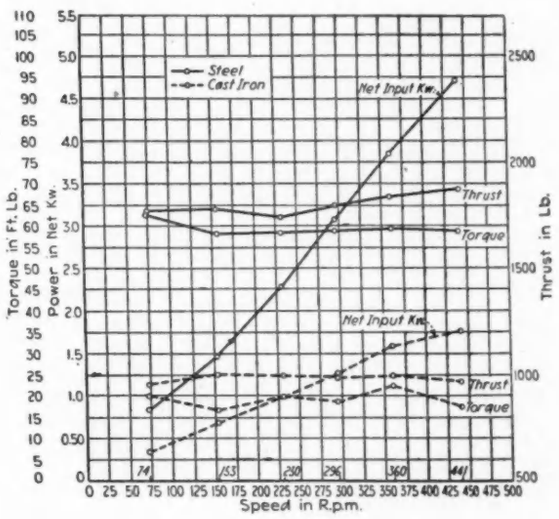


Fig. 6—Variable-speed tests showing torque thrust and net-input kilowatts for steel bar 6 (S.A.E. 6150) and cast iron bar 20, 4-8-28 (20 per cent charcoal pig), with constant speed of 153 r.p.m. Diameter of drill 1¼ in. R

cast irons, one carbon, and one alloy steel for various drill diameters from ½ to 1½ in. and for different speeds, the average conditions are represented by the following:

T = a function of $f^{0.8}$, for cast iron, and
T = a function of $f^{0.78}$, for steel.

5. The thrust increases with the feed, but at a slower rate when drilling cast iron and steel. For the conditions mentioned in 4, the following formulas represent average values:

Th = a function of $f^{0.8}$, for cast iron
$Th.$ = a function of $f^{0.8}$, for a carbon and an alloy steel.

6. In drilling a straight-carbon and an alloy steel with drills varying from ½ to 1½ in. in diameter, at constant speeds of 153 and 230 r.p.m., the torque increases with the drill diameter, but at a greater rate for both cast iron and steel. Average conditions for two cast irons, a plain carbon, and an alloy steel are represented as follows:

T = a function of d^2, for cast iron
T = a function of $d^{1.8}$, for steel.

This may be expressed again, as follows:

$\frac{T_1}{T_2} = \frac{d_1{}^n}{d_2{}^n}$, in which T_1 and d_1 are the known torque and

drill diameter and T_2 is the desired torque for the new diameter d_2. n is 2.0 for cast iron and 1.8 for steel.

7. For the conditions outlined under 6 the thrust is found to vary almost exactly in direct proportion to the diameter of the drill. The values for thrust may be expressed then, as follows:

Th = a function of d, for cast iron, and
Th = a function of d, for steel.

8. Combining the above relations of torque and thrust for cast iron and steel, general equations may be written as follows:

$T = C_1 f^{0.6} d^2$, for cast iron,
$Th = C_3 f^{0.6} d$, for cast iron,
$T = C_2 f^{0.75} d^{1.8}$, for steel, and
$Th = C_4 f^{0.6} d$, for steel, in which T is the torque in foot-pounds, Th is the thrust in pounds, d is the diameter of the drill in inches, f is the feed of the drill in inches per revolution, and C may be called a "hardness class" number, or "machinability factor," that is, a constant depending upon the material being drilled.

9. For general purposes the output horsepower developed at the point of the drill may be assumed to be due only to the torque or

Hp. (computed output) $= 0.0001904TN$ in which
$T = C_1 f^{0.6} d^2$, for cast iron, or
$T = C_2 f^{0.75} d^{1.8}$ for steel.

in which N is the r.p.m. of the drill, f is the feed in inches per revolution of the drill and C_5 and C_6 are constants.

10. The results of the metallographic study may be summed up as follows: The 17 samples of steel as a group are arbitrarily divided into three classes, the first class showing a normal pearlitic structure, or one showing a very slightly spheroidization; the second class consisting of those steels which are partly spheroidized, that is, advanced beyond the beginning stage of spheroidization; and the third class, those very nearly completely spheroidized. A direct connection with the torque in drilling is evident, although the greater the torque the greater is the degree of spheroidization.

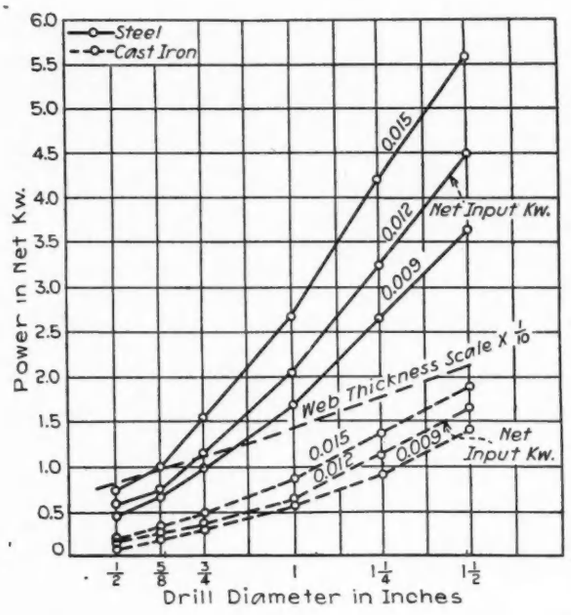


Fig. 8—Variable diameter tests showing net input kilowatts for steel bar 6 and cast iron bar 8A (20 per cent charcoal pig)—feed constant at 0.009, 0.012 and 0.015 in. per rev.—speed constant at 230 r.p.m.

This is just the opposite of what might be expected if all bars were of the same chemical composition.

11. By grouping the materials according to chemical composition in order of increasing torque on the 1-in. drill, a fairly close grouping according to chemical composition, or type of steel, is obtained. This arrangement tends to indicate that the type of steel, the carbon content, and the microstructure are all important factors in determining the value of the torque in drilling.

12. No satisfactory correlation between the hardness values as determined by the Brinell, Rockwell, scleroscope, or the Herbert pendulum hardness tester, and the drilling torque for a given specimen, is evident."

Professor Boston in summing up gave the following values for C in the formulas:

C_1 = 350 average for torque
C_2 = 12,600 average for thrust on bars of 5 and 19
C_4 = 1560—2020
C_4 = 20800—33000

R. M. Galloway inquired about the effect of web thickness. His experience indicates that by decreasing the web thickness, the thrust can be diminished and the feed can be stepped up. He also asked why smaller drills were not tested.

W. W. Nichols mentioned that in some cases the life of drills was increased by thining the point.

Another speaker asked whether oil drills were studied, and whether any attention had been given to the drilling of holes having a depth of 10 to 15 times the diameter of the drill.

In reply, Professor Boston explained that their work was confined to drilling depths about five to seven times the diameter of the drill. Small drills were not tested because they required a different kind of dynamometer.

On the question of web thickness, Mr. Oxford stated that it varies from 1/3 of diameter for small drills to 1/8 of diameter for large drills. He explained that web thickness is largely tied up with the structural design of a drill and must be heavier in proportion on small sizes.

Front-Wheel Drive Has Advantages

(Continued from page 899)

verse vertical plane through the wheel axes may be swung around to make an angle therewith. A number of other designs can be worked out but the problem will tax the ingenuity of the engineer.

Summing up, front-wheel drive permits of lower body floors by eliminating the propeller shaft, which leads to a lower center of gravity, greater stability and increased safety at high speed; it reduces the unsprung weight, thereby improving the riding qualities and adding to tire life, and it reduces the slewing tendency on turns, permitting higher speeds with safety on winding roads.

On the other hand, with the same engine and the same body space, the front drive calls for a longer wheelbase, and up-grades and torque reaction have the effect of reducing the maximum tractive force obtainable, whereas with rear drive the tractive force is increased.

Radio is Now Standard *Equipment* On Several *Car Models*

Practice of wiring for receiving sets continues to be a novelty, however, as public acceptance has not been established generally.

By HAROLD M. BAKER

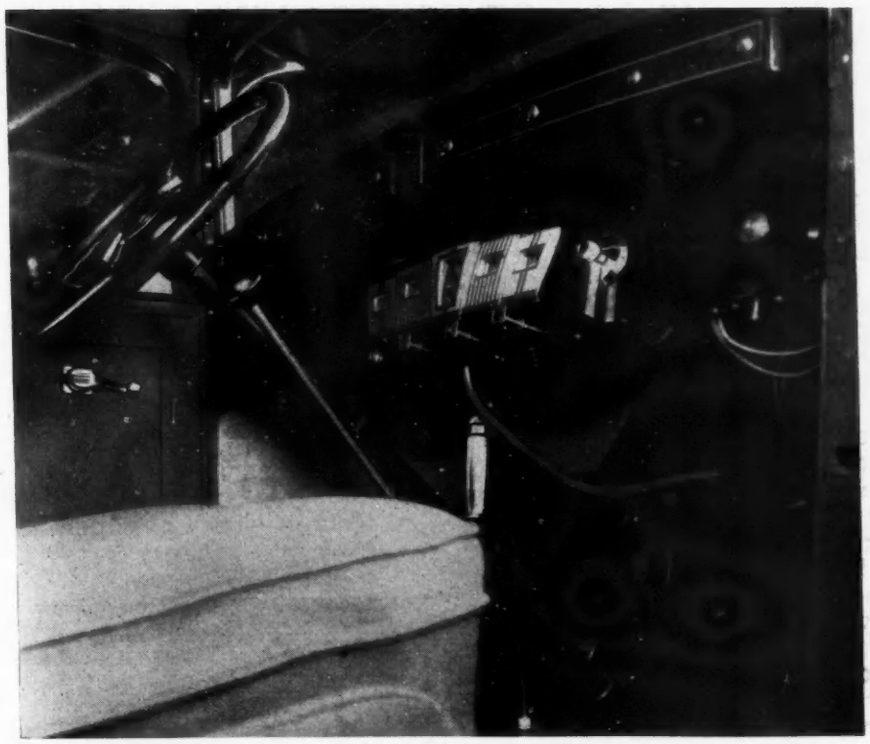
OPINIONS on the possibility of radio as a standard accessory in the automobile differ widely among passenger car manufacturers, but the question commands some consideration in practically all quarters where automotive topics are discussed.

Quite recently a number of automotive executives whose interest in the radio-equipped car previously had been rather indifferent, have displayed a decided curiosity. There are a number of executives representing some of the largest automobile manufacturers, on the other hand, who admit doubt about the future of radio equipment, and who feel that the public should be given more time to manifest its attitude.

Since radio receiving sets first gained popularity in American homes, some seven or eight years ago, there have been individual cases of radio-equipped automobiles. These early examples, however, proved more of a novelty than anything else, and their use was restricted more or less to purposes of advertising. There were too many technical difficulties to be overcome and the cost of intensive experimental work was not recognized as commensurate with the likelihood of immediate public demand.

In recent years the radio has developed from a novelty and a luxury to something closely approaching the indispensable. The phenomenal expansion of the radio industry is something unmatched except by the amazing development of the automobile industry. The product of each has become an item of paramount importance to the American family, and the possibility of combining the advantages of radio and the automobile has long since been considered by far-visioned car manufacturers.

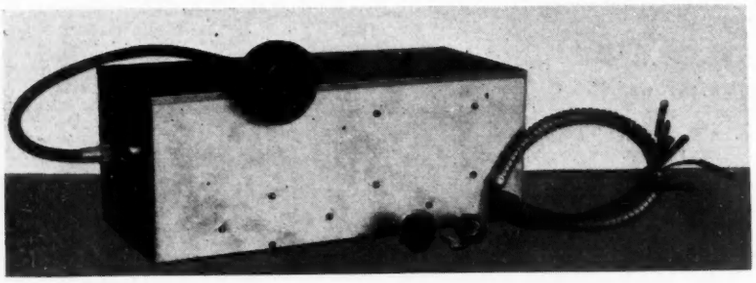
In some quarters argument has been advanced that a radio set in an automobile must necessarily act as a distraction to the driver. There has even been some discussion of the possibility of adverse legislation, or at least legislative control of the use of radio in cars. *Automotive Industries* has not learned of any definite move on the part of any group to place legislative limitations on the use of radio in motor cars. The informal arguments to the effect that a loud speaker would tend to claim too much of the driver's attention, have been met with the opinion that conversation between the driver of a car and his passengers also might be termed a distraction, and one which is offset by the presence of the receiving set.



Chrysler closed car equipped with a Transitone radio. The loud speaker and tubes are behind the instrument panel

Within the past several weeks Alfred P. Sloan, Jr., president of the General Motors Corp., and Walter P. Chrysler, president and chairman of the board of the Chrysler Corp., have expressed the attitudes of their companies on this subject in no uncertain terms. Mr. Sloan said in part:

"Not only do we believe that there is a great opportunity for



Tuning dial and control assembly of the Delco-Remy auto radio

the development of the radio business as an adjunct to the automobile, but the radio field in general is one that is closely related to the automobile and electric business, in which General Motors is engaged."

Mr. Sloan's statement said further: "New Cadillac and LaSalle cars have been designed for radio installation and thousands of installations already have been contracted for by dealers. As quickly as possible the same facilities will be available for other makes of General Motors cars."

For several weeks the Transitone, the radio receiving set manufactured by the Automobile Radio Corp., of New York, has been incorporated as standard equipment on Dodge Brothers Senior Six models and on Dodge Brothers motor coaches. More recently Mr. Chrysler announced that the closed models of the Chrysler "70" and "77" lines were being wired for the installation of radio receiving sets at the owner's option. Mr. Chrysler's statement said in part:

"After exhaustive tests on the road and in the laboratory by engineers of the Chrysler Corp., the Transitone radio was found to provide perfect reception under all conditions imposed by motor car installation. Its inclusion as an engineered unit in Chrysler cars was immediately directed."

A survey among major automobile manufacturers just completed by *Automotive Industries* has revealed that a number of other companies will introduce their cars at the New York show either with radio as optional equipment or with the installation already made for the provision of receiving sets. The number of manufacturers who have taken no steps for the installation of radio in their products, however, is probably larger. Several automobile executives stated positively that they could see no indication of public demand of sufficient strength to warrant any measures for the provision of radios in their cars, at this moment.

In addition to the receiving sets for automobiles which have been placed in production by the Delco-Remy Corp. and by the Automobile Radio Corp., it is understood that the American Bosch Magneto Corp. is about to introduce such a product. Other companies, also, have proposed to enter this field, it is learned.

The Transitone is a six-tube set built integral with the car so that only the tuning dial and switch are visible on the instrument board. The aerial is concealed in the top of the body, the lead-in wire running through the right windshield post. The entire set is composed of four units: speaker, receiver, audio-frequency amplifier and batteries. These, with the exception of the batteries, are enclosed in metal boxes, held in place by heavy steel brackets under the cowl.

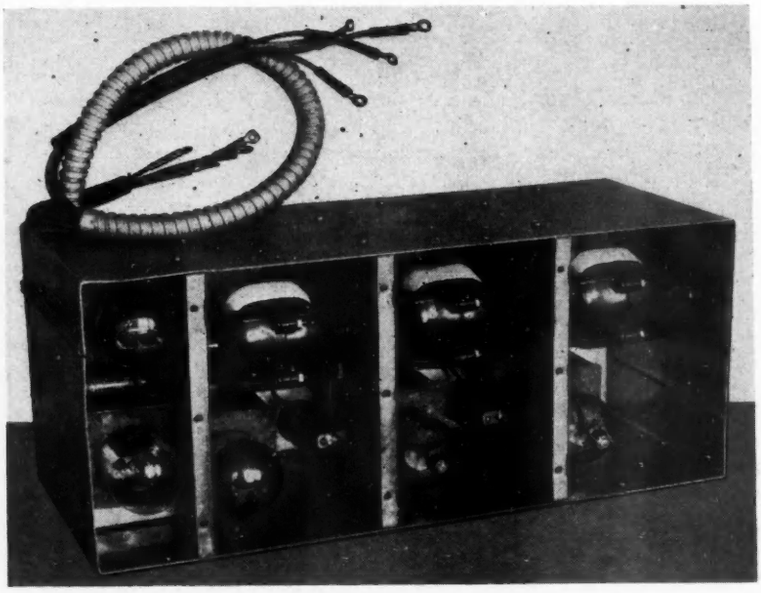
The receiver has three stages of tuning frequency, a detector and two stages of transformer-coupled audio amplification. Three 201-A or 301-A type tubes are used in the frequency sockets; one 112-A-type in the detector socket; one 201-A or 301-A-type in the first audio socket and one 112-A-type in the last audio, or power stage. These sockets are cushioned to prevent the transmission of road shocks, and under normal driving conditions the tubes are said to last virtually the same length of time as those in the regular set.

The receiving set for automobiles introduced by the Delco-Remy Corp., of Anderson, Ind., and being used in Cadillac and LaSalle cars is now being manufactured by the recently organized General Motors Radio Corp., of Dayton, Ohio, which also manufactures the Day-Fan radio home receiving sets. The entire manufacturing and engineering work has been transferred from Anderson to Dayton.

The Delco-Remy automobile radio was developed with particular attention to tone quality and ease of control. When hearing a radio in an automobile for the first few times, it is the novelty of it that holds the attention, and the tone quality is not noticed, but as the novelty wears off, and the owner has an opportunity to compare his auto radio with the set at home, tone quality immediately becomes essential.

Ease of control is essential because the driver does not have time to adjust several dials and controls while he is driving. The Delco-Remy set has a single dial control and an automatic volume control, so that the driver does not have to readjust his volume control each time he passes behind a steel building or under overhead wires. A volume control knob is provided to allow the driver to set the volume to the desired level where the automatic control holds it as long as the station signal strength does not become too weak.

The set uses two stages of shield grid radio frequency amplification, a power detector, and two stages of resistance-coupled audio amplification. Three



Tubes in the Delco-Remy auto radio are cushioned for vibration and shocks

variometers are mounted in line on the same shaft to tune the radio frequency stages.

The set is mounted between the instrument board and dash to the left of the middle of the car and is out of sight. The tuning dial is connected to the set through a flexible shaft similar to a speedometer drive cable, to prevent any disturbance to the tuning adjustments, which might be caused by a slight weaving of the car. A gear reduction is used at each end of this flexible shaft, in order to give a vernier action on the dial as well as to reduce the effect of twisting the flexible shaft. The set is connected by flexible leads to a terminal box on the speaker.

The antenna consists of five parallel wires strung lengthwise between the outer covering of the car top and the upholstering inside the top. The lead-in wire connecting the antenna to the set is covered with a copper braid to prevent it picking up spark noise.

Smaller Output Estimated for 1930

(Continued from page 891)

eral aid for the years 1932 and 1933 would be increased from $75,000,000 to $125,000,000. The 1931 authorization, which already has been apportioned, would be favored with an increase of $50,000,000 under the same bills. The proposed increases are in harmony with recommendations made repeatedly by executives of the American Association of State Highways.

It also is proposed by Mr. Robinson, ranking Republican member of the House committee, to increase forest road funds by $10,000,000 a year for 1931 and 1932. Other proposals have centered around a possible increase of $5,000,000 per year in these funds to a total of $12,500,000 for each fiscal year. This would agree with the general policy of making these authorizations equivalent to 10 per cent of the Federal highway funds.

The Oddie-Colton bill, authorizing $3,500,000 for road construction in public land states, which failed at the last regular session, undoubtedly will be introduced in the present session.

The Seventy-First Congress also will have before it a resolution authorizing the appointment of a commission to study the feasibility of a system of express motorways across the United States. These presumably would be financed through the issuance of government bonds and paid for by tolls. The commission would consist of fifteen members, representing the Senate, House, the interested departments of the government, both major political parties and one individual not connected with any governmental agency. All would serve without compensation.

Undoubtedly efforts will be made during the present session of Congress to divert a part of the Federal aid funds to the improvement of secondary roads, more commonly known as "farm-to-market" roads. The President in his message to Congress expressed himself as being in favor of an increase of Federal aid and also referred to the secondary road situation. He said in part: "Federal aid in the construction of the highway system in conjunction with the states has proved to be beneficial and stimulating. We must ultimately give consideration to the increase of our contribution to these systems, particularly with a view to stimulating the improvement of farm-to-market roads."

There is a bill before Congress which would appropriate $50,000,000 a year for the improvement of roads not in the Federal aid system, and another which would create a special highway fund from the proceeds of the sale of surplus war materials to France.

Bills to give the Department of Agriculture through the Bureau of Public Roads more complete supervision over the granting of toll bridge franchises and the terms of their operation on interstate routes will have further consideration at the present session of Congress. Other bills have been introduced looking to a liberalizing of Federal highway aid for roads leading to such toll bridges.

Serious consideration is expected to be given to the subject of the regulation of interstate bus operations.

Provisions for the purchase of motor vehicle equipment by the different departments will be contained, as usual, in the annual appropriation bills.

The tariff bill, which was considered during the special session of the Seventy-First Congress, provides for reductions in the automobile tariff and increases on many of the raw materials used in automotive manufacture.

The bill introduced by Congressman L. E. Cramton, of Michigan, to simplify and make more uniform government purchasing is before the House judiciary committee, to which it was referred in the special session.

Funds have been authorized to enable the United States to participate in a reconnoissance survey of the route of the Inter-American Highway through Central America. The money undoubtedly will be appropriated during the present session of Congress and actual work begun on the survey. Mr. McLeod, of Michigan, has introduced a bill providing for a conference of Latin American nations in Washington to consider the construction of an Inter-American Highway.

Other bills in which the automotive industry is interested include those proposing reorganization of government departments, ratification of commercial treaties, settlement of tariff difficulties with a number of other nations, a supplemental appropriation for the Sixth International Road Congress to be held in Washington next October, railroad consolidation, and possible changes in laws relating to the seizure of motor vehicles as a result of prohibition or customs law violations.

Thus the automobile industry faces 1930 with favorable prospects in both the business and national legislative fields.

Just Among Ourselves

Goodwill—
Always in Demand

"EH, what? *Automotive Industries?* What's that . . . Oh, the automobile and parts and accessory manufacturers? Why, I'm surely glad to see you. Sit right down and tell me what's on your mind."

Santa Claus motioned us to a big, comfortable overstuffed leather chair that reposed beside the long, flat-topped mahogany desk which was the center of his efficient-looking office adjacent to the big North Pole Toy and Goodwill factories of which he has been the chief executive since long before the first Model T was produced.

The old gentleman looked just as ruddy and jolly as when we first glimpsed him more than thirty years ago surreptitiously sticking a red and white striped candy cane in the stocking which we had hung over the fireplace. He seemed just a little thinner, just a little more as though he had a lot of things on his mind and just a bit more pushed for time than on that hazily remembered Christmas Eve of long ago. But his eyes sparkled with the same keen twinkle and he seemed glad to tilt back his swivel chair and relax for a moment as he awaited our reply to his greeting.

"We know you're awfully busy just at this time of year," we began, "but being the editor of an enterprising business paper like *Automotive Industries* we felt as though we owed it to our readers to provide some real information that nobody else had been able to give them. Looking the situation over, we found that practically everybody who is anybody in the world—except yourself—had been interviewed about the business outlook for next year and that most of them had expressed some kind of ideas about the automotive future. So we figured on scoring a beat, by getting this exclusive interview with you . . . And we certainly hope you won't disappoint us, because it isn't any joke driving all the way up here in a roadster. We figured that if you could still go around in that open sleigh at your age, we ought to be able to come up here in our roadster without discomfort, but say . . .

"It's a gift," Santa Claus replied, stroking his beard and trying to appear modest. "About this automobile business of yours, though," he went on, "I certainly couldn't refuse you fellows a favor after all you've done for me. Why, just look out there." His arm swept the panorama of factories and shops which appeared through the big

window beside him. "I never could have kept up with the terrific demands that have been made on me in the last twenty-five years, if I hadn't been able to filch a lot of manufacturing and production ideas from your industry . . . Oh, yes, I'm an honorary member of the Society of Automotive Engineers and I follow the activities of the production division with particular care.

"Of course, you fellows have run up against some economic problems that I haven't had to meet yet. You got your production geared up so that you could build more cars than there was an immediate demand for. Now I don't have that trouble. I've been able to keep up with the toy demand pretty well, but I want to tell you this Goodwill demand has me worried. The need for Goodwill among men always seems to exceed the supply by a big margin no matter how much I increase the output of my Goodwill plants.

"Take your own automotive industry, for example," he continued. "Right from that one business alone my present advance orders call for 200 per cent increase in production for 1930 as compared with 1929. I sometimes wonder what is done with all the Goodwill that is demanded and supplied to the automotive industry. I have my research division working on an investigation right now to see if a lot of it isn't being bought but never used in any practical way. I have begun to think that a good bit of it is just used for window display; never put into the actual working out of relations between different elements of the industry or between various men in different departments of the same business. And still the demand keeps up; seems like an economic impossibility.

"Goodwill is like anything else, you know," Santa Claus went on, a little more seriously now. "It has to reach the hands of the ultimate consumer before my organization can consider that it really has been sold. If I could get better use of Goodwill, then the present output of my factories might meet the demand. At any rate that's the phase of the situation I'm working on right now and I have every hope that more individuals in the automobile business are going to cooperate along these lines in 1930 than ever before.

"Yes, times are changing," the aged Saint continued. "They always have and always will, for that matter. I find it a pleasure to keep changing with the times. I honestly believe that it's my real positive joy in doing this that has enabled me to hold my job over all these years and to remain the leader in my profession. If I had insisted on keeping on with old methods up here, I'd be a back number today.

(Continued on page 912)

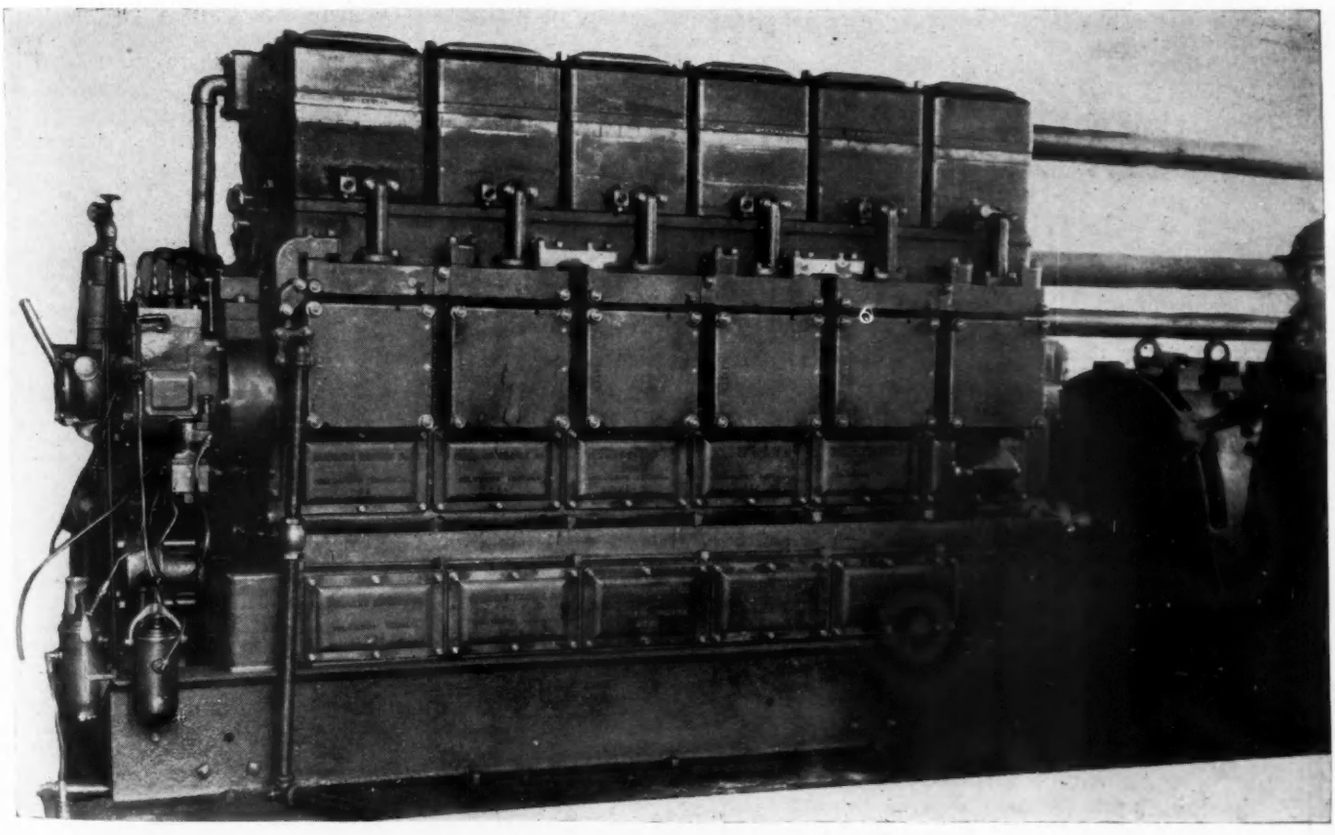
Cummins Diesel for Locomotive Is Given Test Run

Six-cylinder, solid-injection engine developed for railroads from line of marine and industrial units.

A SIX-CYLINDER, solid-injection Diesel engine for railroad locomotive work has been built by the Cummins Engine Co., of Columbus, Ind., and was inspected recently by a number of railroad officials while undergoing tests. The engine is a development of a smaller unit which has been built for several years for marine and industrial purposes. It has a bore of 10 in. and a stroke of 12 in., and is rated at 500 hp. at 800 r.p.m. A governor is fitted, and the speed can be varied from an idling speed of 350 r.p.m. to the maximum. All of the structural parts are of cast iron and no particular effort was made to save weight, as weight is essential in locomotive practice. The weight of this engine is 15,000 lb. or 30 lb. p. hp. The Cummins company is preparing to build two additional engines of similar design, one of which is for rail car work, and in this it is planned to save considerable weight by the use of aluminum in parts that are not highly stressed.

In the tests a mean effective pressure as high as 142 lb. p. sq. in. was obtained, which, if it could be maintained at the rated speed, would correspond to 820 hp. However, the generator used for the tests was entirely incapable of taking such a load, and in taking "full load" diagrams it was necessary to disconnect the fuel from five cylinders and run on a single cylinder. At such heavy loading the exhaust naturally was quite black. It is the belief of the manufacturer, however, that 570 hp. can be obtained with reasonable economy and clear exhaust, and that the engine has a reserve of about 20 per cent beyond its rating.

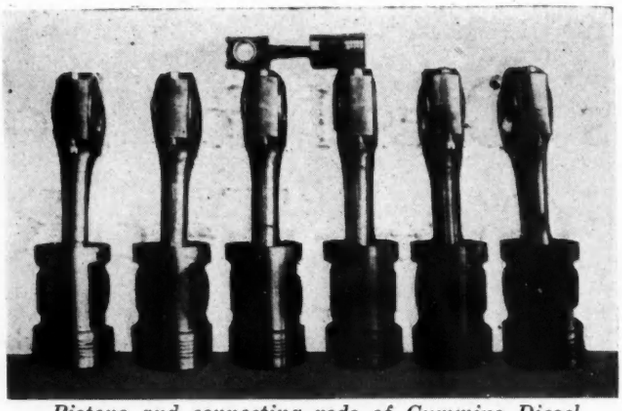
In the tests, which were made for the Pennsylvania Railroad Co., thermo-couples were inserted in the exhaust ports in the cylinder head directly in the path of the exhaust gases as they pass the exhaust valves, and the greatest difference in temperature obtained between any two cylinders was 40 deg. Fahr. (1020-980



Cummins 500 hp. Diesel engine for locomotive use

deg.), we are informed, showing a remarkably good fuel distribution.

The engine is completely inclosed and all moving parts are pressure-lubricated, the pressure on the oil being maintained at 100 lb. p. sq. in. The driving gear of the pump is integral with its shaft, which latter is hollow and extends into the end of the bored-out crankshaft, where it is driven by an internal key. Discharge from the pressure-relief valve is into the timing gear housing, while the main delivery from the pump passes through a cored passage in its cover and through the hollow shaft into the crankshaft. Hence there are no pipe connections carrying lubricating oil under pressure.



Pistons and connecting rods of Cummins Diesel engine. Their size is indicated by the automobile piston and rod across the two center rods

A very large line takes oil from the crankshaft system and delivers it to the camshaft end bearing, where it enters the hollow camshaft, from which it flows through radial drill holes to the various camshaft bearings, and thence on up to the rocker shaft and rocker arm bearings. Drilled passages lead out to adjusting screws which have ball-and-socket connections in push-rods. These adjusting screws are grooved and drilled down to the sockets. As a consequence, all moving parts of the valve mechanism are pressure-lubricated, which cushions them and results in silent operation, it is claimed. Surplus oil from the pushrod sockets at the upper ends runs down the pushrods, thereby thoroughly lubricating the short rocker arms with rollers which operate the pushrods from the cams. Pressure lubrication is supplied even to the pins carrying the governor weights.

The connecting rods are of tubular type, with a steel tube welded in them to carry lubricant to the piston pin bearing. The pistons are of cast iron, of unusually light design, and with ribbing for strength. Removable liners are used in what is referred to as the "cylinder tank," each liner being seated against a copper gasket.

Cooling water is circulated by a centrifugal pump, which is bolted with its outlet over a cored opening into the cylinder block. It is driven from the idler gear, the same as the governor. To insure circulation through the cylinder jackets in accordance with requirements, a screw or helix of variable pitch was cast inside the cylinder tank. When the liner is inserted, this forms a helical passage which the water enters at the bottom. The pitch of the helix increases gradually toward the top, hence the water flows more rapidly over the top portion of the cylinder wall, which is said to be desirable. In addition to the water from the cylinder jacket, the head jacket receives water directly from the pump, this latter entering it at its hottest parts, around the exhaust valve seats and guides. Inserted valve stem guides of bronze are used, and are in direct contact with the cooling water. From the cylinder head the cooling water flows through a jacket on the exhaust manifold, communication between head jacket and manifold jacket being through ports over the exhaust ports.

Particular claims are made for the fuel pump, which is valveless and so designed that it cannot deliver more fuel to one cylinder than to any other, it is claimed. Its principle of operation is similar to that of the breaker-distributor of the ignition system of a gasoline engine. Metering is effected by a single plunger with variable stroke, which latter is under the control of the governor. A distributor disk moving in synchronism with the plunger performs the valve functions and also places the pump chamber in communication with the different combustion chambers successively.

To insure that the pump chamber may be filled at every stroke, even at high speeds, the fuel is maintained under pressure in the supply line by a small gear pump of ample capacity. At the same time the port between the supply line and the pump chamber is opened by the distributor disk, the plunger is raised by cam action.

The Cummins injection principle is used in connection with this engine, which consists in preheating the charge through three cycles, then gasifying it and mechanically injecting the gasified charge. It is claimed to be this advance preparation of the fuel charge which makes possible the relatively high speed and horsepower obtained from the engine.

Just Among Ourselves

(Continued from page 910)

"The sleigh and reindeers? Well, I just stick to them for sentiment's sake personally, but my real distribution today is taken care of entirely by motor trucks, as you well know. Couldn't handle it otherwise.

* * *

"For 1930—Peace on Earth, Good Work by Men"

"IN line with my policy of keeping up with the times, I'm having all my old slogans changed for 1930. While we are going to continue intensive effort on this Goodwill proposition as I have indicated I feel just a little as though 1930 gives a good opportunity for changing an old motto slightly. Here's a proof sheet of a new one," he remarked, reaching over to a pile of papers on his desk and withdrawing one on which the printer's ink still was wet. It read: "For 1930: Peace on earth, good work by men."

"And now if there's nothing else, I'll follow out the idea myself," he concluded, "and get back to work."

As I was going out the door, he called back over his shoulder: "Don't forget to convey to all of your readers my personal wish for a very Merry Christmas and Happy New Year."

We hereby do so, and echo the wish ourselves.—N.G.S.

Highway Bonds Are Major Debts Incurred by States

Securities for roads and bridges total half of outstanding issues for public expenditures. Increase in loans has been rapid since 1922. South active.

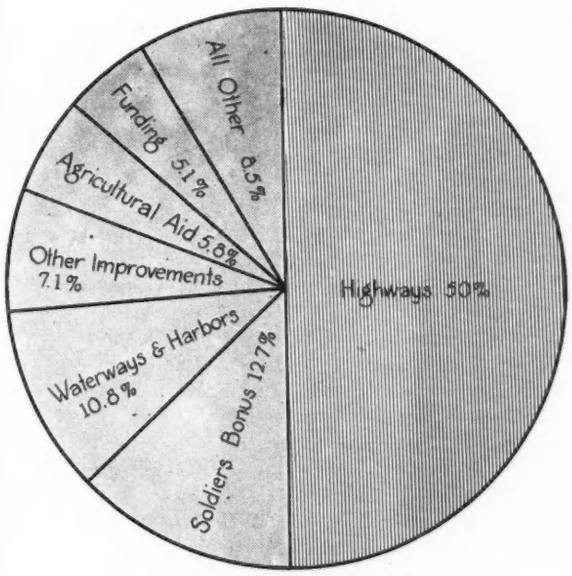
HIGHWAY and bridge construction continues to play the dominant role among the purposes for which the states of the Union have incurred bonded indebtedness. On July 1, 1929, the total indebtedness was $2,142,007,491 and of that amount $1,070,432,307, or 50 per cent, was incurred for highways, according to a survey made by the Bank of America, N. A., New York.

The most rapid increase in debts for highways has come in recent years. In 1922 only 34 per cent of the total debt outstanding represented bonds for highways, but the demands for this purpose have mounted steadily and in the period January, 1928, to July of this year highways accounted for 99.3 per cent of the total increase of $170,653,-324.

Viewed as a whole, the sum expended for highways appears to be extremely large, but when the per capita debt for this purpose is considered in relation to the economic advantages accruing to the citizens of the states, its size is moderate. In 1922 the per capita debt for highways was $3.50, whereas today, after seven years of intensive highway construction through state bonds, it amounts to only $8.91.

Carrying the study of this debt survey even further reveals the significant fact that the greatest activity is taking place in the Southern States. Having lagged behind the Northern States in issuing bonds for highways the Southern States are now making up for lost time and in the 18 months' period prior to July, 1929, the highway bonds issued by seven Southern States account for 65 per cent of the total debt increase for that period.

These figures do not, of course, represent the entire expenditure for the highways of the country. Counties and and municipalities have expended huge sums and the Federal government has aided. In addition, there have been approximately $46,000,000 worth of new highway bonds issued too recently for the Bank of America to include in its compilation. These issues, according to the Bank, were made by 11 states, of which eight are in the South.



Division of state indebtedness

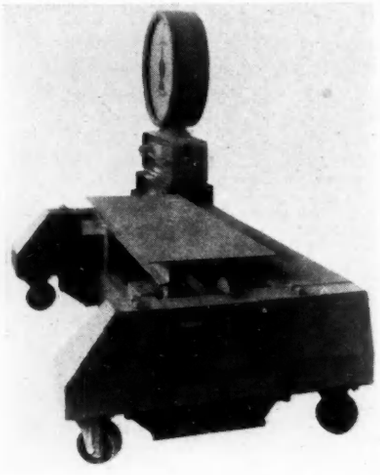
The Purposes of State Indebtedness

Purpose of Debt	Amount Outstanding Jan., 1928	Amount Outstanding July, 1929	Per Cent 1928	Per Cent 1929
Highways	$900,930,781.92	$1,070,432,307.21	45.7	50.0
Soldiers' Bonus	282,430,000.00	272,086,260.00	14.3	12.7
Waterways and Harbors	224,484,800.00	231,055,800.00	11.4	10.8
Other Improvements	141,551,162.00	152,187,912.00	7.2	7.1
Agricultural Aid	120,187,839.39	124,932,299.39	6.1	5.8
Funding Operations	112,211,014.40	109,379,024.82	5.7	5.1
Welfare Institutions	65,765,600.00	64,518,450.00	3.3	3.0
Miscellaneous	44,648,626.48	40,169,274.02	2.3	1.9
Education	43,011,532.25	37,743,742.40	2.2	1.8
Public Buildings	26,561,523.28	32,963,234.28	1.3	1.5
Other Military Purposes	9,571,287.54	6,539,187.54	0.5	0.3
Total	$1,971,354,167.26	$2,142,007,491.66	100.0	100.0

NEW DEVELOPMENTS—Automotive

Portable Airplane Scale

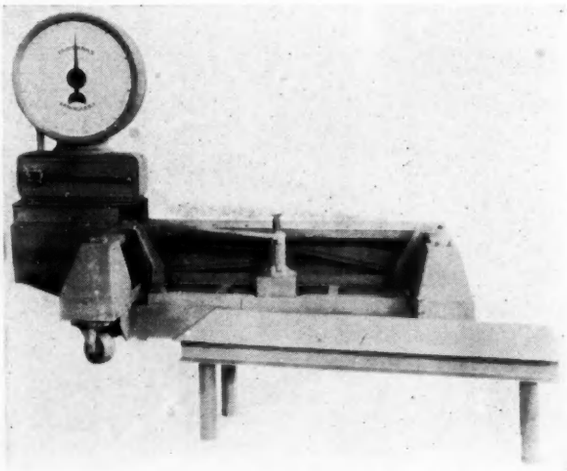
A PORTABLE scale for weighing airplanes is now being manufactured by Fairbanks, Morse & Co., Chicago. The scales are designed to be used in pairs, a right and left respectively, which go under the two landing wheels. These scales are provided with hydraulic jacks so located that they can be spotted underneath the pad or the axle on the inside of the landing wheel, where there is usually some provision for locating the jack when raising the ship for changing tires. The tail skids can be weighed on a portable scale, and by using a special rack the scale can be made suitable for weighing the tail skids with the ship in the flying position. For weighing the tail skids, scales with very low columns are used, or if they are furnished with a dial, the latter should be set close to the scale frame to minimize the headroom required.



Scale, fitted with table, adjusted for weighing wings and parts

These scales are also provided with a removable platform which can be used for weighing wings, fuselages and other heavy parts. The dials offset the platform in both directions, so that long pieces can extend past them without interference. The scales are very substantially designed, which is said to be required for accuracy. The chief advantage claimed for them as compared with ordinary scales is that they greatly reduce the risk of accidents in weighing.

To facilitate leveling the scale so the weighbridge will set without side thrust, an indicator is attached at each end of the weighbridge which moves over a circle on the frame of the scale. After the ship is mounted on the scale, the latter is moved about until the indicator hands are exactly above their marks.

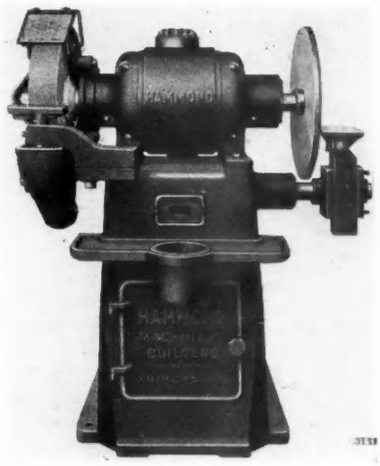


Fairbanks scale for weighing complete airplane

Disk and Grinder

DESIGNED for intermittent use, a new combination disk and production grinder has been placed on the market by the Hammond Machinery Builders, Inc., Kalamazoo, Mich.

These machines are equipped with a fully inclosed 40-deg. C type motor, fitted with an air cleaner (patent applied for) which supplies clean air to the motor. Electrical control equipment comprises push button control and an automatic motor starter, having thermal overload protection, low voltage and phase failure protection. The automatic starter is conveniently mounted on the inside of the pedestal door. The mainshaft is mounted on ball bearings, completely inclosed and protected from dust and grit by double labyrinth seals. Oil reservoirs are provided with convenient oil cups, oil level gage and drain plug.



Hammond combination disk and production grinder

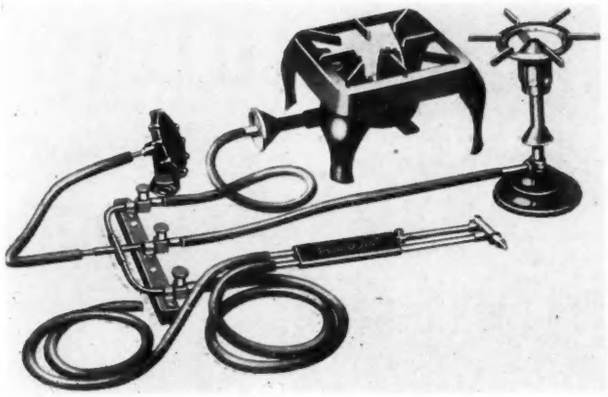
The disks are machined on both sides so that two disk wheels can be mounted at one time and each disk can be reversed. In this way, the disk renders twice the number of service hours, with one operation of changing and mounting. These machines are made in four sizes, 2, 3, 5 and 7½ hp. capacity, for 220 and 440-volt, 25 to 60 cycles and 110 and 220-volt. If desired they can also be fitted with disks on both ends, and with either plain or universal lever tables.

Laboratory Flame Apparatus

TESTING laboratories often have occasion to use small flame apparatus giving a flame that can be easily controlled and is not enough to melt various metals. A convenient laboratory installation, made by the Prest-O-Lite Co., 30 E. Forty-second Street, New York, consists of a small tank of dissolved acetylene, a hot plate, a Bunsen burner, an acetylene-and-air torch with air control, a reducing valve, a three-way branch valve, and the necessary red-gum tubing.

With this outfit many kinds of laboratory tests can

Parts, Accessories and Production Tools



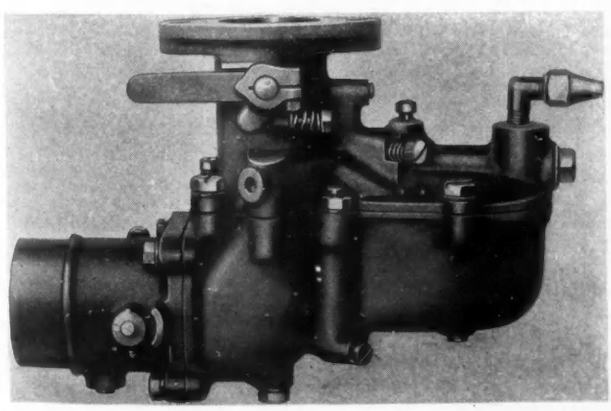
High-temperature-flame apparatus

be made. Dissolved acetylene has the advantage that it gives a higher flame temperature than coal gas or natural gas, besides which the flame can be readily controlled. The flame is non-oxidizing and non-carbonizing.

A special design of torch has been developed for test work and uses compressed air in addition to dissolved acetylene. By a twist of the adjusting screw, which varies the air supply, the flame may be changed from the brush type to an intense needle point. The brush or Bunsen flame has a temperature of approximately 2800 deg. Fahr., while the temperature of the needle-point flame is approximately 3300 deg. Temperatures can be controlled through a wide range by adjusting the gas pressure.

Zenith Heavy Duty Carburetor

IN addition to the new 110 series wide range carburetors recently announced by the Zenith Detroit Corp., this company has also announced a special series for heavy duty. Known as the series 90, and produced in sizes from 1 to 2 in., it is particularly designed for truck, bus and industrial use. Large bearing areas, simplicity and ruggedness of design are said to be major features. It incorporates a compensator passage and well, effective on sudden throttle openings.



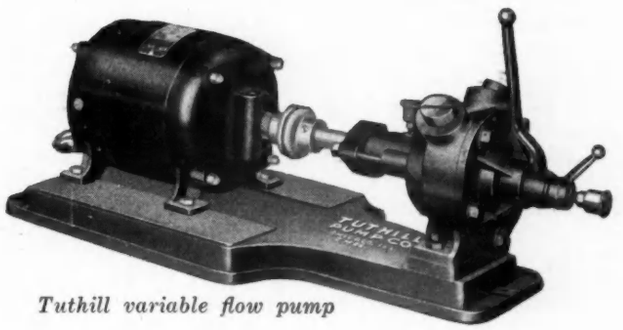
Zenith heavy duty carburetor, Series 90

Reversible Flow Pump

A MOTOR-DRIVEN, variable and reversible flow pump, suitable for operating assembly floors and test floors, is offered by the Tuthill Pump Co., Chicago, Ill.

It provides a convenient, portable unit particularly adapted both for filling gearboxes with oil during testing and for withdrawing the oil afterward. This is accomplished through the ability to reverse the flow of oil without reversing the rotation of the motor.

This pump is also a practical unit for flushing gearboxes with kerosene after a running-in test, as the liquid may be withdrawn simply by reversing the flow.

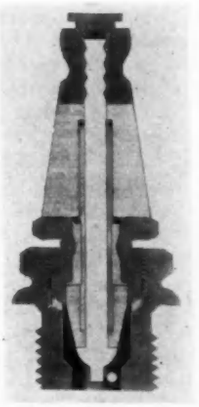


Tuthill variable flow pump

AC Mica Plugs

A COMPLETE line of mica-insulated spark plugs especially designed for aircraft engines, and supplementing their present line, is announced by the A. C. Spark Plug Co., Flint, Mich.

The new mica spark plug is made gas tight by an electric process. A brass seal bushing located between a steel gland and the insulator is compressed and while electrically heated is molded into position. These plugs have been graded according to heat range, making it possible to provide the correct plug for not only ordinary operating conditions, but for any extreme operating conditions encountered. The extent to which an AC plug is hot or cool is determined by the length of insulation exposed to the combustion gases. The plugs are demountable, with metal parts cadmium-plated to prevent rusting.



Section view of the new AC mica spark plug

ACCORDING to the annual report of the director of the Bureau of Standards, for the fiscal year which ended June, 30, 1929, recently issued, $26,833 was spent during that year in an investigation of automotive engines.

First with the News

Reliable, Accurate

AUTOMOTIVE INDUSTRIES

News of the Industry

PAGE 916 VOLUME 61 *Philadelphia, Saturday, December 21, 1929* NUMBER 25

December Output Figure Expected to Reach 175,000

PHILADELPHIA, Dec. 21—December production of motor vehicles is expected to reach 175,000 units, it is indicated by factory estimates of the month's production in the United States and Canada. This was the output figure estimated for December, of course, in approximating the total production for 1929 at 5,650,000 units. Details considered in making this calculation are given in the lead feature article of this issue. Production of motor vehicles in the United States for November was 217,441 units, according to the Department of Commerce. The estimate of the National Automobile Chamber of Commerce for the same period was 216,000, according to figures published the first week in December.

Canadian plants have resumed production in most cases, following shutdowns for inventory and preparation for new models. Some United States' plants will take inventory during the Christmas holidays, but most of them are busy with the first turnout of new models.

A few scattered reports continue to be received of price reductions made to clear stocks of old models, but the indications are that such activity is about ended. Emphasis at the factories is entirely on the new models. Production of these, according to widespread sentiment, will be cautious in the beginning until the markets are well sounded by sales executives.

Studebaker Stocks Down

SOUTH BEND, Dec. 18—Fewer Studebaker and Erskine cars were in the hands of dealers as of Dec. 1 than at any time during the past five years, according to A. R. Erskine, president of the Studebaker Corp. The corporation's own stock of new cars was approximately 40 per cent less on Dec. 1 than on the corresponding date of 1928, according to the announcement.

Slack Leaves Peerless

CLEVELAND, Dec. 19—Fred W. Slack has resigned as vice-president and chief engineer of the Peerless Motor Car Co. to become associated with the overseas division of General Motors Export Co. Mr. Slack has been a member of the Peerless organization for a number of years, becoming chief engineer in 1922. Previous to his connection with Peerless he was with the Packard and Chalmers-Detroit companies.

Eddins Heads Olds Succeeding Reuter

LANSING, MICH., Dec. 19.—The appointment of I. J. Reuter, president of the Olds Motor Works, as managing director of the Opel Motor Works, Russelsheim, Germany, and the announcement that D. S. Eddins, vice-president and general sales manager of the Olds Motor Works, had been appointed to succeed him at Olds, were features of a dinner given by the Olds Makers Club here tonight. The announcement of the two appointments was made by Alfred P. Sloan, Jr., president of the General Motors Corp., who was present at the dinner.

According to Mr. Sloan's statement, J. J. Carter, factory manager of the Olds Motor Works, will accompany Mr. Reuter to Germany for an indefinite tenure, and J. T. Collins will succeed to Mr. Eddins' position as general sales manager of the Olds Motor Works. Mr. Reuter and Mr. Eddins will sail Dec. 26 for Germany, where they will assume their duties as managers of the Opel Motor Works, in which the General Motors Corp. bought a heavy stock interest earlier in the year. The present move is a consummation of General Motors' announcement at the time of purchase that American management would be introduced in the Opel Works.

Mr. Reuter's entrance into the automobile manufacturing field was in 1902, when he organized the Flint Automobile Co. In 1909 General Motors placed him in charge of the Welch-Detroit Motor Co. In 1912 he organized the Little Motor Car Co., Flint, later merged with the Mason Motor Co. and the Chevrolet Motor Co., and became Chevrolet vice-president. He was first assistant to the president of General Motors from 1918 to 1920.

He was elected president of the Olds Motor Works in January, 1925, succeeding A. B. C. Hardy, who resigned on account of ill health. Previously he had been general manager of the Olds Division, General Motors Corp., the manufacturing portion of the Olds Motor Works. He came to this position after making a notable record in the production field with the Remy Electric Co. of Anderson, Ind.

I. J. Reuter

who has been appointed managing director of the Opel Motor Works, in Russelsheim, Germany

Junkers Producing New Plane

WASHINGTON, Dec. 17—A light two-seated all-metal long wing monoplane known as the "A 50" or "Junkers-Junior" type, has been developed by the Junkers Air Co., according to a report received in the Department of Commerce from assistant trade commissioner, A. Douglas Cook, Berlin. This plane is capable of carrying two passengers and 65 lb. of baggage on a 4 or 5 hr. flight.

Advocates Changes in Tariff Schedule

Price at Origin Should Fix Canadian Duty, Campbell Says

OTTAWA, ONT., Dec. 17—That the Canadian market be further protected against the importation of complete cars by establishing the price in the country of origin as the basis for dutiable valuation was the suggestion of W. R. Campbell, president of Ford Motors of Canada, Ltd., presented before a hearing of the Tariff Advisory Board of the Dominion of Canada. The hearing was being held to give automobile manufacturers of the Dominion opportunity to prove that they had passed on to the consumer the benefit of the abolition of an excise tax of 5 per cent formerly levied against automobiles valued at $1,200 or less.

In presenting his case Mr. Campbell declared that his company had already made the necessary price adjustments in its products. In addition, he advocated that the existing tariff law be changed to require that cars assembled in Canada should contain at least 60 per cent of parts manufactured in Canada to make them eligible for a refund on the tariff assessment. The present law provides for a refund of tariff levied on cars which contain 50 per cent or more of parts manufactured in Canada.

J. F. D. Malcolm, of the Hayes-Anderson Motor Co., Vancouver, B. C., asked, in a brief, that the basis of the duty on motor trucks and parts be made the same in order that Canadian assemblers of trucks would be able to sell their product in competition with trucks assembled outside the Dominion.

French Companies Unite

WASHINGTON, Dec. 18—Several large companies in the French aeronautical industry are entering into a merger, according to a report received in the Aeronautics Trades Division, Department of Commerce, from Trade Commissioner W. L. Finger, Paris. This new group to be known as the Societe Generale Aeronautique is to be capitalized at 400 million francs (approximately $16,000,000) and will be the most powerful aviation corporation in France and thus one of the largest in Europe.

The following companies will be included in the new group: The Argenteuil Division of the Lorraine-Dietrich Company, an important manufacturer of automobiles and airplane engines; the Hanriot Company, manufacturing training planes; the Societe d'Emboutiage et Construction Metallique, makers of all-metal planes; the Chantiers Aero-Maritimes de la Seine, producers of seaplanes, and about 75 per cent of the stock of Nieuport-Astra, constructors of pursuit and racing planes.

Majority of States Use Hoover Code

WASHINGTON, D. C., Dec. 18—The National Conference on Street and Highway Traffic, better known as the Hoover Conference, meeting here this week, reports that 25 states have now adopted the Hoover Code, either in whole or in part, for the regulation of highway traffic. Wherever this code had been adopted it had been found to work very satisfactorily, and the committee will continue its promotional work in order to secure its more general adoption. William E. Metzger, vice-president of Federal Motor Truck Co., presided at the meeting.

Republic Steel Corp. Merges Four Makers

NEW YORK, Dec. 18—Consolidation of four large independent steel companies into a single unit with assets approaching $350,000,000, has been announced here and in Cleveland by a financial group headed by Cyrus S. Eaton, Cleveland capitalist. The companies involved are: the Republic Iron and Steel Co., which includes the Central Alloy Steel Corp., Donner Steel, Inc., and the Bourne-Fuller Co. The consolidated unit will be known as the Republic Steel Corp. Tom M. Girdler, former president of Jones & Laughlin, will be chairman of the board, and E. T. McCleary will be president.

The merger has been approved by the directors of the companies involved and will be presented for the approval of the stockholders later. It is intimated that other units may join.

Deny Consolidation

NEW YORK, Dec. 18—Press reports to the effect that the Bendix Aviation Corp. and the Consolidated Instrument Corp. of America were seeking a basis for merger by the exchange of Consolidated shares for Bendix stock have been denied by the president of both companies involved.

Special Days Set for New York Show

Miles Announces List of Additional Space Assigned

NEW YORK, Dec. 17—The Hudson Motor Car Co., the Studebaker Corp. and Chrysler Motors have been assigned additional space for exhibit at the Chicago National Automobile Show, according to an announcement by S. A. Miles, show manager.

Several manufacturers of accessories have registered for exhibition at the New York Show since the previous announcement. They are: Automotive Service Bureau, Baltimore; H. R. Crane, New York; Superior Distributors, Inc., New York; Waltham Watch Co., Waltham, Mass., and Maurice Mertens, Paris. The Hoyt Distributing Corp., Chicago, will be an additional exhibitor at the Chicago show.

The following special days have been designated for the New York Show: Monday, Jan. 6, International Day; Tuesday, Jan. 7, Municipal Day; Wednesday, Jan. 8, Army and Navy Day; Thursday, Jan. 9, Aviation and Engineers Day; Friday, Jan. 10, Theatrical Day, and Saturday, Jan. 11, Suburban Day.

Caterpillar Cuts Prices

SAN LEANDRO, CALIF., Dec. 18—Reductions in the price of every major item of equipment for road building, farm logging, and construction, have been announced by R. C. Force, president of the Caterpillar Tractor Co. On road-graders and combine harvesters the reductions range from $100 to $520 per unit; on road graders and maintainers manufactured at the Indianapolis plant reductions go as high as $300 on the motor patrol.

During the next 90 days the company will employ an additional 2000 to 3000 men at its Peoria plant, according to the announcement, bringing the number on the payroll at this plant to around 7000 workers.

Financial Notes

Company	Announces
Aviation Corp.	net loss $335,389 3rd quar., after charges.
Black & Decker Mfg. Co.	reg. quar. div. 40 cts. com., 50 cts. pref. Dec. 31 record Jan. 5.
Detroit Steel Products	ex. div. 40 cts., reg. div. 25 cts. Jan. 2 record Dec. 20 and Feb. 1 record Jan. 1.
Doehler Die Casting	reg. quar. div. $1.75 on $7 prf., 87½ cts. on 7 per cent. prf. Jan. 7 record Dec. 21.
Firestone Tire and Rubber	initial div. 40 cts. new com. Jan. 20 record Jan. 5.
General Tire and Rubber	reg. quar. prf. div. $1.50. Dec. 31 record Dec. 20.
Graham-Paige	reg. quar. div 1st pref. $1.75, Jan. 1 record Dec. 14.
Irving Air Chute	net prof. 9 mos. $466,533 aft. chg. and tx. equals $3.13 a share on 209,000 sh. n. p.
Logan Gear Co.	net prof. 10 mos. $490,373 bef. tx., $2.68/sh. reg. div., 40 cts. prf., 25 cts. com. Jan. 1 record. Dec. 23.
Marlin-Rockwell Corp.	sp. div. $1.50, ex. div. 75 cts., reg. div. 50 cts. on common. Jan. 2 record Dec. 20.
McCord Radiator and Mfg.	reg. div. cl. A. 75 cts. Jan. 2 record Dec. 31.
McQuay-Norris	reg. quar. div 50 cts. stock div. 1 per cent. Jan. 2. record. Dec. 21.
Paramount Cab Mfg. Co.	reg. quar. div. 60 cts. Jan. 2 record Dec. 10.
Seiberling Rubber Co.	reg. quar prf. div. $2. Jan. 2 record Dec. 20.

Men of the Industry and What They Are Doing

Dornier Sails for Europe

Dr. Claude Dornier, designer of the DO-X airplane, who has been in this country making arrangements for the manufacture of the planes here by the Dornier Corp. of America, subsidiary of General Motors Corp. and Fokker Aircraft Corp. of America, left last week on the S. S. *Bremen* to spend the holidays at his home. He is accompanied by Mrs. Dornier. He expects to return to this country after the holidays to complete arrangements for the manufacture of the plane over here.

Johnson Addresses Group

Pyke Johnson, Washington representative of the National Automobile Chamber of Commerce, described the Pan American Highway Conference of 1929 and the condition of Latin American roads to the delegates of the Highway Research Board, division of engineering and industrial research, who met at a dinner in Washington Dec. 12, during a stated meeting of the Board.

Lawrence Returns to U. S.

A. M. Lawrence, formerly managing director of General Motors Near East, Alexandria, arrived in New York, Dec. 18 aboard the S. S. *Olympic* to visit the home office of General Motors Export Co. and to receive a new assignment. He was accompanied by Mrs. Lawrence.

Doyle Succeeds Taylor

H. O. Doyle has been named district manager of the Chrysler Sales Corp. with headquarters at Memphis. He succeeds George M. Taylor, who has gone to Baltimore to enter another phase of the automobile business. Mr. Doyle came with the Chrysler organization ten years ago.

Welch Succeeds Holmes

R. G. Holmes, a Detroit representative of Manning, Maxwell & Moore, Inc., of New York, has severed his connection with the company, according to an announcement from the New York office, and has been replaced in the same territory by J. H. Welch.

Harkness is Promoted

John L. Harkness has been advanced from the position of assistant production manager of the Sikorsky Manufacturing Corp., Bridgeport, Conn., to executive engineer.

Oliver is Advanced

Wallace F. Oliver has been made chief engineer of the Hydraulic Brake Co., Detroit. His previous post was assistant chief engineer.

T. F. Campbell Gets New Post

Announcement has been made by W. W. Lewis, assistant general sales manager and director of advertising of the Cadillac Motor Car Co., Detroit, Mich., of the appointment of Trueman F. Campbell as assistant director of advertising, succeeding **David R. Erwin**, who goes to the General Motors Export Co. as acting advertising manager. Mr. Campbell has been with Cadillac since 1922. For five years he was engaged in advertising and sales work at the Chicago branch of the company; for the last two and one-half years he has been attached to the sales department of the Cadillac factory, working on the factory's national program of sales helps for retail salesmen and dealers. Prior to coming to Cadillac, Mr. Campbell was connected with the advertising department of the Paige-Detroit Motor Car Co.

General Motors Export Assigns 13 Engineers

NEW YORK, Dec. 16—The General Motors Export Co. has sent abroad 13 transportation engineers following the transportation school recently held at Pontiac, Mich. The duties of these transportation engineers will not be directly connected with sales of General Motors chassis and bodies, but will be to sell the idea of commercial motor transportation to the business population. They will be loaned free of charge to anyone with a commercial transportation problem, regardless of whether the sale of General Motors products is immediately or even remotely in sight.

The transportation engineers and their assignments are as follows: **Ira Snead**, Batavia, Java; **W. H. Smith**, Alexandria, Egypt; **H. L. Powell**, Sao Paulo, Brazil; **C. W. Nugent**, Warsaw, Poland; **H. G. Magginetti**, Bombay, India; **D. B. Wood**, Port Elizabeth, South Africa; **J. D. Morello**, Madrid, Spain; **A. L. Schoff**, Osaka, Japan; **A. Colligon**, Antwerp, Belgium; **O. L. Lindstrom**, Stockholm, Sweden; **L. S. Challe**, Paris, France; **J. Coates**, Wellington, New Zealand, and **T. Timm**, Copenhagen, Denmark. The last six of these had been sent to the school by the plants to which they were reassigned.

Dodge Joins Bendix

Adiel Y. Dodge, who until recently was president of the A. Y. Dodge Co., South Bend, Ind., has joined the Bendix Aviation Corp. of that city as consulting engineer.

Fisher Appoints Crusoe

DETROIT, Dec. 16—**C. A. Crusoe** has been appointed director of purchasing of the Fisher Body Corp., to succeed **J. T. Stratman**, who has resigned. Mr. Crusoe formerly was purchasing agent for the Ohio plant of the company, located in Detroit. **E. J. Hill**, assistant director of purchases of the Fisher corporation, has resigned, as has **G. L. Severy**, of the purchasing division, who has been succeeded by Ray Rheim.

Ford Gets Medal

Henry Ford was the recipient last week of a gold medal presented by the Pennsylvania Society at a dinner in the Hotel Astor, New York. The presentation was made by Charles M. Schwab, president of the society, who said that it was given to Mr. Ford as the "first man to promulgate the doctrine that for the real prosperity of this country the working man should be prosperous."

De Juhaz Returns from Europe

Prof. Kalman J. de Juhaz has returned to the engineering experiment station at Pennsylvania State College, after spending three months in Europe studying the development of the internal combustion engine. Professor de Juhaz is the inventor of the high-speed engine indicator which was described in *Automotive Industries* recently.

Fokker Goes to Europe

Anthony H. G. Fokker, consultant of the Fokker Aircraft Corp., sailed last week on the Bremen to complete business which he was transacting on his earlier trip, which was interrupted in order that he might return to this country to carry forward certain negotiations which were pending.

Barton Heads Aircraft Accounts

E. S. Evans, president of the Detroit Aircraft Corp., has appointed Roy G. Barton, formerly auditor of the Lockheed Aircraft Corp., as chief accountant of the Detroit company. Mr. Barton will also have charge of credits.

Mock Gets Post

Richard M. Mock, formerly aeronautic engineer with the Bellanca Aircraft Corp., New Castle, Del., has been appointed supervisor of design and construction of airplanes for the American market by the Ernst Heinkel Flugzeugwerke, Warnemunde, Germany.

Axelson Appoints Merrill

L. F. Merrill, for eight years connected with eastern aviation interests, has been appointed chief engineer for the Axelson Aircraft Engine Co., Los Angeles, Calif.

Automotive Buying Gains, Steel Producers Report

NEW YORK, Dec. 19—Further improvement is noted this week in the volume of first quarter business being placed by automotive consumers, especially so in sheets, strip steel and bars. While individual orders are perhaps not as heavy as sellers would like to have them, the number of automotive buyers in the market is unquestionably greater, and, as a result, gains in the rate of operations ranging from 5 to 10 per cent are reported by most of the mill centers.

Some of the steel now being finished can not be shipped before January, postponements until after the completion of their inventories having been requested by many of the motor car and parts manufacturers.

Shut-downs over the holidays will be of varying lengths, but sufficient business has accumulated to have caused at least some of the producers to curtail operating intermissions somewhat more than had been their plan a few weeks ago. Suspension of activities during the holidays will give most of the finishing mills a fairly good backlog for their 1930 start.

While the market's general price structure remains unchanged, some of the smaller buyers are being accorded tonnage prices. In the market for cold-rolled strip there are rumors of a few important consumers having been able of late to do $1 or $2 a ton better than formerly, but on the whole there isn't much pressure on prices.

Quotations on semi-finished steel remain nominally at $35, but it is understood that in some recent transactions this price has been shaded $1 per ton.

Pig Iron—Decidedly better interest is being shown by automotive foundries in first quarter contracts, but the prevailing opinion among consumers is that they will lose nothing by going leisurely about covering their needs. Blast furnace representatives have reaffirmed going prices which are $19.50 @ $20 in the Michigan market and $18.50 for foundry and $19 for malleable in the Valley district.

Aluminum—Very little in the way of fresh developments is noted. Current wants of automotive consumers are covered by old contracts, and much in the way of new commitments is hardly looked for before the new year. Price levels remain unaltered.

Copper—The market is marking time. Metal is being offered in the "outside" market at 17.75 cents, as compared with the 18 cents price named by producers, but there is relatively little interest in offerings.

Tin—Wall Street houses received early this week London cables reporting that the Tin Producers' Assn., "in order to restore balance between supply and demand, and to reestablish industry upon sound and permanent footing," recommended a seven days' shut-down of all tin mines in January and February, and if necessary, in March, as well as suspension at all mines from 10 o'clock Saturday nights to 6 o'clock Monday mornings throughout 1930. The market has turned strong.

Lead—Storage battery demand continues good. The market is unchanged and steady.

Ford Workers Clear New Land in Brazil

PHILADELPHIA, Dec. 17—According to press reports from Brazil, the Ford Industrial Co., of Brazil, Henry Ford's venture in rubber growing in South America, has met the first requirement of an option on 2,470,000 acres of land along the Tapajoz River by clearing 988 acres and planting seedlings. In addition to this more than 1000 acres of additional land has been cleared, and is now ready for planting, the report said. About 1800 men are working on the concession.

Zinc—Sellers came out early this week with offers of zinc at 5.50 cents, East St. Louis, a decline of 15 points from the price named in earlier offerings.

New Engine Developed

COMPTON, CAL., Dec. 16—The Panther, a 150 hp., seven-cylinder, air-cooled engine, which was developed during the past two years by the MacClatchie Manufacturing Company, Compton, Cal., recently completed its 50-hour test and has been awarded the official certificate of the Department of Commerce. This is said to be the first L-head radial engine that has received the approval of the Department.

One of the features of design is that the engine has no long pushrods and rocker arms. The overall diameter, which is of great importance on account of its effect on the wind resistance, is only 35 in. The problem of lubrication is simplified in the new engine because its number of parts is unusually small.

Truck Group Reorganized

NEW HAVEN, Dec. 17—The Motor Truck Association of Connecticut last night underwent a complete reorganization and entered upon a program of active work in behalf of truck operators throughout the state. Edward F. Loomis, secretary of the Motor Truck Committee of the National Automobile Chamber of Commerce, New York, was present and outlined to more than 75 truck operators the various functions which such an association should fill.

Stearns Co. May Dissolve

TOLEDO, Dec. 18—A meeting of the stockholders of the F. B. Stearns Co., control of which was held by John N. Willys, has been called for Dec. 30, to vote on dissolution of the company and sale of its property.

Lift Company Adding

MEMPHIS, Dec. 16—The Auto Rotary Lift Co. is adding a second unit which doubles the capacity of the original plant, according to an announcement made here. The new unit is 40 ft. by 150 ft. The company manufactures a patented hydraulic lift.

Spanish Automobile Co. Formed by Government

PARIS, Dec. 3 (*Special*)—Backed by Government subsidies, the Spanish National Automobile Co. is about to be established in Barcelona with the object of producing automobiles for the Spanish market. The manager of the company is M. Pezzara, who has secured a certain amount of notoriety as the inventor of a helicopter. Chief engineer is M. Moglia, an Italian, who has been connected in France with the Talbot, Ballot and Aries companies. The works manager is Jean Chassagne, former race driver, who until recently was connected with the Ballot company in Paris, and formerly was on the staff of the Sunbeam and the Talbot companies. It is understood that designs are advanced for the production of a straight eight and a straight twelve.

The Spanish Government has been endeavoring for more than a year to induce either French or American firms to establish an automobile factory in their territory. Recently negotiations were in an advanced condition with the Hotchkiss company, of Paris, but eventually these were broken off. So far as can be ascertained no established automobile factory is back of the Spanish venture.

To Produce Plane

ST. JOSEPH, MO., Dec. 16—The Bird Wing Commercial Aircraft Co. announces that it has received a Department of Commerce certificate on its "Imperial" Model 10 biplane, powered with a Wright 165 hp. engine and is ready to go into production. Officers and directors of the company are announced as follows: William L. Goetz, president; Carl H. Wolfley, vice-president and general manager; Harry Block, treasurer; Melvin E. Binswanger, secretary, and Frank R. Harrington, R. T. McCrum, chief engineer, and Dr. T. O. Pierce, directors.

Blue Gaining Favor

NEW YORK, Dec. 18—The blue and brown color families used in the painting of automobile bodies have commenced to advance once more after declining steadily for more than a month, according to the December issue of the "Automobile Color Index" published by E. I. du Pont de Nemours & Co. According to the index, which records the definitive trends for October in the present issue, blue stood at 204, brown at 134, black at 90, green at 80, grey at 45, and maroon at 37 for the month.

Deere Acquires Wagner

MOLINE, ILL., Dec. 16—With acquisition of the Wagner-Langemo Co., Minneapolis, patents, Deere & Co. has added threshing machines to its line of farm equipment machines. The thresher will be manufactured at the John Deere Harvester Works in East Moline and distributed through the John Deere branch houses and John Deere dealers.

Steel Founders Expect Favorable 1930 Business

PITTSBURGH, Dec. 16—A canvass of business conditions made at the meeting of the Central Atlantic Division of the Steel Founders Society of America held here Dec. 12 revealed that while most of the firms represented found that business had declined recently, the results for the whole year 1929 will be good, and that the industry has no misgivings about the situation for 1930.

A paper read at the meeting by George Batty, director of research, Steel Castings Development Bureau, Philadelphia, pointed out the undeveloped wealth in the steel foundry industry, pleading for giving the foundry more technical information, and applying practical experience in the general scheme of the foundry business.

Division meetings were held in the afternoon. The large-castings meeting was presided over by G. H. Friesel, United Engineering and Foundry Co., and the small-castings meeting presided over by H. J. Koch, Fort Pitt Steel Castings Co.

Sloan Says Production Due for Future Jump

NEW YORK, Dec. 16—"With the passing of a few years, the record-breaking automobile production of 1929 will represent only a commonplace performance, with a stabilized upward trend year after year in proportion to the growth of population and wealth," said Alfred P. Sloan, Jr., president of the General Motors Corp., in a statement issued here today.

"The replacement market has been an important factor contributing to the record-breaking performance of 1929, and should prove an even more important factor in stabilizing the industry's sales in 1930 and the years following," the statement said.

Buick Plants Close

DETROIT, Dec. 18—Plants of the Buick Motor Co. at Flint, Mich., have been closed for annual inventory, according to an announcement made by E. T. Strong, president and general manager. In suspending production at this time, the company follows a long established annual custom of taking inventory during the holiday season.

A.A.A. Asks More Road Aid

WASHINGTON, D. C., Dec. 16—Thomas P. Henry, president of the American Automobile Association, today filed a brief with the House Committee on Roads in support of motordom's appeal to Congress for an increase in the annual appropriation for Federal aid from the present amount of $75,000,000 a year to $125,000,000 annually.

Denver Plant to Reopen

DENVER, Dec. 18—Seven hundred men will return to work at the Denver assembling plant of the Ford Motor Co., Dec. 30, according to reports current here. The force will be later increased to 1000 men, it is said.

Chrysler to Occupy New Office for Show

DETROIT, Dec. 17—Announcement has been made by J. E. Fields, vice-president in charge of sales of Chrysler Motors, that departmental offices for each division will be maintained during automobile show week on the third floor of the new Chrysler Building. At these offices sales, advertising and service executives of each division will be accessible during regular business hours to handle all matters pertaining to the various Chrysler companies.

Dye Trust and Standard Pool Patent Interests

BERLIN, Dec. 17—According to a press notice issued by the I. G. Farbengesellschaft (German Dye Trust) this company and the Standard Oil Company of New Jersey have pooled their patents on processes for the hydrogenation of coal and oil in countries outside of Germany and have formed a company for the exploitation of these patents which will be jointly owned, but will be controlled by Standard Oil. A special agreement has been made covering the German market for synthetic gasoline produced by the Farbengesellschaft. It is further pointed out in the communique that the close cooperation of the two parties to the contract will assure the examination and development of new products and processes.

Oakland Dealers to Meet

DETROIT, Dec. 16—Approximately 5000 Oakland-Pontiac dealers throughout the country will attend a series of special sales meetings to be held in 35 cities from this date to Jan. 2 by the Oakland Motor Car Co. Some 900 dealers from the Pontiac, Mich.; Detroit, Chicago, Cleveland and Indianapolis zones will attend meetings at the General Motors Proving Ground this week under the direction of A. R. Glancy, president.

Mr. Glancy, who is conservatively optimistic about the business outlook for next year, has included the following in his message to the dealers: "We are not making any rash predictions regarding automobile sales next year, but intend to build according to the retail demand as reflected by our dealers' forecasts. There will be no crowding or forcing of cars on our dealers."

Correction

A member of the engineering department of the Ford Motor Co. has written to call attention to the fact that the horsepower rating given to the improved Fordson tractor in a news article in *Automotive Industries* for Dec. 14 was in error. The tractor, according to his statement, develops 30 b.hp. at 1000 r.p.m.

Electric Auto-Lite Co. Opens New Sarnia Plant

TOLEDO, Dec. 17—Formal opening of the new branch of the Electric Auto-Lite Co., at Sarnia, Ont., Dec. 18 will be marked by a civic jubilee attended by C. O. Miniger, president, and 20 other executives from the Toledo plant. The new Sarnia plant will take care of the starting, lighting and ignition equipment business for Ford Motors of Canada, Ltd., Canadian Willys-Overland, Ltd., and Durant of Canada, Ltd., and will employ several hundred men.

With contracts for the entire electrical equipment business of Ford, the Electric Auto-Lite Co. is expected to manufacture more than 2,750,000 sets in 1930, or 20 per cent more than during the current year, it was indicated by Mr. Miniger. The new million-dollar addition to the Toledo plant will be completed by Jan. 15, it was announced.

Olds Resumes Output; Viking Prices Raised

DETROIT, Dec. 16—The Olds Motor Works has increased the prices of the Viking car $100 on all models. This brings the price of each of the three body models (four-door sedan, brougham and convertible coupe) to $1,695 with standard equipment, while the price of each model with special equipment is now $1,795, and with de luxe equipment, $1,770.

Production was resumed in all departments of the company today following shut-down for inventory. The Lansing unit of the Fisher Body Corp. also was reopened today. Numerous changes and improvements in the arrangement of the Olds company's facilities have been put into effect, with a number of departments in new and larger buildings and previously announced. It is expected that operations will be well under way within a week or 10 days.

Val Haresnape Resigns

WASHINGTON, Dec. 18—Sharp differences with Ernest N. Smith, executive vice-president of the American Automobile Association, have caused Val Haresnape, secretary of the Contest Board of the Association, to resign. Mr. Haresnape has announced his intention of spending some time in southern California, because of ill health from which he has suffered recently. He asserts that he has not lost his interest in racing, and will probably act in an advisory capacity to racing organizations.

N. J. Registrations Drop

NEW YORK, Dec. 18—New car registrations in New Jersey during November totaled 5409 as compared with 5959 in November a year ago, according to Sherlock & Arnold. Total new car registrations for the 11 months to date are 121,022 as compared with 103,747 for the corresponding 11 months last year.

December Building Gains Over Last Year's Total

PHILADELPHIA, Dec. 19—Bookings for machine tools and announcements of proposed construction in the automotive industry were ahead of totals announced for the first half of December, 1928. Several automobile plants and parts manufacturers are considering new installations for the immediate future, it is reported.

Among the building projects announced this week were:

Groever Loening Co., New York, has been incorporated with $1,000,000 capital for experimental work and production of single-motor aircraft at 305 E. Forty-sixth St.

M. J. Ort, New York architect, planning service and repair garage to cost about $200,000.

Parkway Motor Co., White Plains, N. Y., will soon begin construction of $100,000 garage structure. P. B. Nichols, Depot Plaza, architect.

G. G. Miller, New York, filed plans for $200,000 service and repair garage.

Kent Garage Investing Dept., New York, will soon begin construction of $1,000,000 service and repair garage in Newark. Fougner & Gautier, New York, architects.

Farman Aircraft Corp., of France (Ludington Aircraft, Inc., Philadelphia), has plans for $100,000 airplane manufacturing plant near Camden, N. J.

Lycoming Mfg. Co., Williamsport, Pa., gasoline automobile, truck and motorboat engines, subsidiary of Auburn Automobile Co., announces $250,000 construction program for radial airplane engine manufacturing plant. W. H. Beal, vice-president, in charge.

American Bosch Magneto Corp., Springfield, Mass., considering $50,000 addition for heat-treating.

Hastings Mfg. Co., Hastings, Mich., piston rings, will immediately build $70,000 addition to manufacturing plant.

Limousine Body Co., Kalamazoo, Mich., subsidiary of Auburn Automobile Co., Auburn, Ind., will construct $100,000 addition to body manufacturing plant.

Morris Plans Plane Engine

LONDON, Nov. 27—It is stated today that the engine for airplanes which rumor has alleged is to be produced by Morris interests is still far from the production stage. The design is complete and experimental engines are being built; if these pass their type-test imposed by the Air Ministry they will go into large scale production at once. But, according to Sir William Morris, this is not likely to take place for some time yet. The only other information concerning the engine that is available at present is that it will develop about 145 hp.

Aviation Service is Topic

NEW YORK, Dec. 16—Aviation service was the topic discussed at the regular monthly meeting of the Automotive Service Association, held in the American Women's Association Building here this week. George Chapline, director of service for Wright Aeronautical Corp., and Charles Froesch, general service and parts manager of the Fokker Aircraft Corp. of America, were the principal speakers.

Defiance to Enlarge Plant

DEFIANCE, OHIO, Dec. 16—Award of a contract for production of parts for the Ford Motor Co. will necessitate the enlargement of the Defiance Screw Machine Products Co.'s plant, Sidney Thompson, president of the concern, has announced. The expansion, making the factory's production the greatest in its history, will be made soon after Jan. 1, Mr. Thompson said.

Licensed Pilots Now 9279, Says Report

WASHINGTON, Dec. 17—Airplane pilots to the number of 9279 have been licensed by the Department of Commerce, according to figures on the progress of aeronautics made public by the aeronautics branch of the department. Licensed mechanics now number 7196, and permits have been issued to 28,739 students, according to the report.

Changes Dealer Policy

LONDON, Nov. 27—It is announced today that a change is to be made in the Ford policy in England as to the terms upon which dealers are supplied with cars for stock. Instead of insisting upon receiving checks certified by bankers before delivering stock vehicles to the company's accredited dealers, the latter will be given 90 days' credit on the minimum range of models each one is required to hold under the terms of his contract.

Plans Widespread Agencies

ST. LOUIS, Dec. 16—Sales agencies for Ryan planes are to be established in every city of more than 10,000 population, officials of the Ryan Aircraft Corp. have announced. Preference will be given in the appointment of representatives to organizations capable of giving service, John C. Nulsen, general manager of the Ryan company, explained. Many automobile companies already have been given sales franchises and more will be taken into the sales organization.

Reports Large Orders

ST. LOUIS, Dec. 16—The Nicholas-Beazley Airplane Co. of Marshall, Mo., reports 100 orders on hand for Barling NB-3 monoplanes. Orders for 50 planes were received within the last two weeks. The sale of spare parts and aeronautical supplies is exceptionally good for this time of year, Sales Manager Speer reports. As a result of the construction activity a Department of Commerce inspector has been assigned permanently to the Barling factory.

Forms New Division

CHICAGO, Dec. 18—The formation of a new corporation to be known as the Oakes Products Corp., which will operate as a division of the Houdaille-Hershey Corp., and will take over the business formerly operated by the Oakes Division, the Hershey Mfg. Co., and the Detroit Carrier & Mfg. Co., all divisions of the Houdaille-Hershey Corp., has been announced.

Business in Brief

Written by the Guaranty Trust Co., New York, exclusively for AUTOMOTIVE INDUSTRIES.

NEW YORK, Dec. 19—Retail trade in seasonable goods profited by the favorable weather; but the main feature of trade last week was the retail holiday business. Wholesale and jobbing trade did not make a very satisfactory showing, and it seems to be the tendency for this line of business to decrease as the time for taking inventory approaches.

CRUDE OIL PRODUCTION

Average daily crude oil production for the week ended Dec. 7 amounted to 2,630,550 bbl., as against 2,638,200 bbl. for the preceding week and 2,520,850 bbl. a year ago.

FREIGHT CAR LOADINGS

Railway freight loadings for the week ended Nov. 30 totaled 837,107 cars, which marks a decline of 63,449 cars below those a year ago and a decline of 81,380 cars below those two years ago.

FISHER'S INDEX

Professor Fisher's index of wholesale commodity prices for the week ended Dec. 14 stood at 92.6, as against 92.7 the week before and 92.3 two weeks before.

COTTON CLOTH OUTPUT

Production of cotton cloth during November, as reported by the Association of Cotton Textile Merchants of New York, amounted to 345,146,000 yards. Shipments during that month were equivalent to 80.1 per cent of production, and sales amounted to 64.6 per cent of production.

FACTORY EMPLOYMENT

The September and October gains in New York state factory employment were offset by the widespread seasonal reductions during November. However, the number of factory workers employed during November was two per cent above those both in the corresponding month a year ago and in the corresponding month two years ago.

STOCK MARKET

The stock market at the beginning of last week was somewhat irregular, but with prices generally higher. On Thursday the market endured a bad break, and most issues closed the week with net losses. The volume of trading was fairly large, and call money remained unchanged at 4½ per cent.

FEDERAL RESERVE STATEMENT

The consolidated statement of the Federal Reserve banks for the week ended Dec. 11 showed decreases of $103,400,000 in holdings of discounted bills and of $4,000,000 in member bank reserve deposits. There were increases of $65,300,000 in holdings of bills bought in the open market and of $31,800,000 in holdings of Government securities. The reserve ratio on Dec. 11 was 71.6 per cent, as against 71.5 per cent a week earlier and 71.8 per cent two weeks earlier.

British Car Makers Seek Reduction of HP. Taxes

LONDON, Dec. 16 (*By Cable*)—Representatives of the British Motor Manufacturers who are conferring with government representatives relative to how the latter can assist the industry to absorb more labor and increase exports, are urging retention of import duties on automobiles, and taxation of passenger cars on a piston displacement basis of ten shillings per 100 cc. rather than the existing basis of 20 shillings per horsepower (tax formula). The proposal would represent an average 33 per cent reduction in the tax if accepted.

It is being urged by the manufacturer's representatives that corresponding reductions be applied to existing tax on bus seating capacity and the truck tax on unladen weight.

Newspaper reports that the Government has adopted these proposals are incorrect. Probably they will not. Nor is it correct to say that manufacturers will urge an increased gasoline duty as another alternative to the existing basis of taxation.

Colonel Hacking, director of the British makers section of the Society of British Motor Manufacturers and Traders, definitely has stated that if the government does not accept the above suggestions in full, the motor industry unanimously will advocate no basic change whatever.

Budd Plans Write-off

PHILADELPHIA, Dec. 18—Edward G. Budd, president of the Budd Wheel Co., has announced that at the annual February meeting of the stockholders of the company a plan will be submitted to remove certain developmental and other expenditures from the balance sheet of the corporation. In a statement accompanying the announcement he said:

"The total wheel production of the company for the year 1929 to date, shows a more than 100 per cent increase over production during the first 11 months of 1928.

"A program of development which has been under way for the past two years promises new products from which much is expected during coming months."

Lambert Has New Engine

MOLINE, ILL., Dec. 16—The Lambert Aircraft Engine Corp., subsidiary of the Allied Aviation Industries, Inc., and successor to the Velie Motors Corp., has developed a new lightweight engine. It has been approved by the U. S. Department of Commerce, and 25 engines are now under construction.

Packard Plans Normal Winter

DETROIT, Dec. 14—Packard Motor Car Co. will go through the winter months with substantial production and is planning for normal business in 1930, according to H. W. Peters, vice-president in charge of distribution.

N.A.C.A. Plans Huge Wind Tunnel

NEWPORT NEWS, Dec. 16—A wind tunnel for testing airplane models, which is expected to be five times larger than any other of its kind, costing between $800,000 and $900,000 will shortly be installed at Langley Field for the National Advisory Committee on Aeronautics, according to an announcement made here recently by H. J. E. Reid, chief engineer of the N.A.C.A. A seaplane test basin is also contemplated, according to the announcement.

Martin Motor Truck Co. Gets Ground for Plant

NEW YORK, Dec. 16—The Martin Motor Truck Co. has closed contracts with a group of citizens from Waverly, N. Y., and Sayre and Towanda, Pa., conveying approximately 10 acres of vacant property at Waverly to the company. This property is bounded by the Lehigh Valley and Erie Railroads. The company will erect its first manufacturing unit on this site, the unit to comprise about 50,000 sq. ft., exclusive of powerhouse.

It is planned to have this new plant completed by May 1 and start the manufacture of light delivery trucks on a production basis there at that time. At present, operations are being carried on at Garden City, L. I., getting the material in shape to start production on a light car.

Recent appointments to the executive personnel of the Martin company include the following: John D. Rix, superintendent of die and sheet metal stamping; Joseph J. Matt, superintendent of motor construction, and E. W. Darling, chief draftsman. Black & Bigelow have been appointed supervising engineers.

Fiat to Purchase Itala

PARIS, Dec. 3 (*Special*)—Arrangements are almost completed whereby the Fiat Automobile Co., of Turin, Italy, will purchase the Itala Automobile Co., of that city. This will be the third automobile factory absorbed by Fiat during the past 12 months, the others being Ceirano and Spa.

Established in 1904, Itala is one of the oldest of the Italian automobile factories. At present it is in production on a single model of 122 cu. in. piston displacement, designed by Engineer Cappa. It is not yet known whether Fiat will contine this model or, as in the case of Spa and Ceirano, make use of the factory for other lines.

Duplate Adds Series

PITTSBURGH, Dec. 17—The Duplate Corp. has added two types of laminated glass to their line, according to an announcement from the company. A window glass and a photo glass, 3/16 in., and ⅛ in. thick, respectively, are the additions.

British Car Sales Show Increase Over Last Year

LONDON, Dec. 7 (*Special*)—The third quarterly return for 1929 of new motor vehicle registrations issued by the Ministry of Transport indicates that the sales of passenger cars, trucks, buses, coaches and taxicabs continue to increase in comparison with last year. For the nine months passenger car sales showed an increase of nearly 7 per cent, trucks over 46 per cent and public passenger vehicles 8 per cent.

The following are the figures of the first nine months of the two years:

	1st Quar.	2nd Quar.	3rd Quar.	9 Mos.
Cars 1929	37,193	58,064	41,982	137,239
" 1928	33,633	56,136	39,430	129,199
Trucks 1929 ...	10,590	14,603	13,738	38,931
" 1928 ...	7,925	9,424	9,312	26,661
Buses, etc., 1929	1,471	4,095	3,382	8,948
" " 1928	1,461	3,695	3,024	8,180

The new cars registered during the third quarter consisted of 81.5 per cent sedans; in the third quarter of 1928 the percentage was 68.8.

Board of trade returns applying to the six months ending Oct. 31 show that automobile exports continue to increase over last year. The total for the period was £8,856,203, as compared with £7,118,936 in 1928. Tire exports increased from £2,798,323 to £3,487,449. Automobile imports increased from 5½ to 7½ millions sterling.

Ballot Firm is Purchased

PARIS, Dec. 2 (*Special*)—A group composed of Hispano-Suiza and Mathis interests has just completed the purchase of the Etablissements Ballot, of Paris, manufacturers of passenger cars, stationary and marine engines, etc. E. M. Ballot, founder of the company and until recently general manager, will retain a holding, but in future will take no active part in the management. Marc K. Birkigt, chief engineer of the Hispano-Suiza Co., will assume technical control of the new organization. For the present there will be no change in the Ballot models, but it is understood the factory will be made use of to an important extent in the production of Hispano-Suiza aviation engines.

Chevrolet Breaks Record

DETROIT, Dec. 21—Surpassing by 150,000 cars and trucks its previous record annual achievement, the Chevrolet Motor Co., this year, will manufacture 1,350,000 automobiles, it was announced at the central offices here today. An all-time monthly production mark was set in May, when the Chevrolet factories built 160,895 cars. A new high monthly record was established in every month except January, according to the announcement.

Monark Plans New Plant

CHICAGO, Dec. 16—The Monark Battery Co. plans to build a new Chicago plant about May 1, according to an announcement made here today. The Philadelphia warehouse of the company will be converted into a manufacturing plant also, the announcement says.

Ohio Plants Dropped in November Employment

COLUMBUS, Dec. 16—In a recent bulletin issued by the Bureau of Business Research of Ohio State University it is shown that there was a decline in November over October to the extent of eight per cent in employment in the automobile and automotive parts and accessories industries in Ohio. Likewise, employment in November was 18 per cent less than during November, 1928. Of the 55 reporting concerns, 40 showed decreases in November employment over October and 15 showed increases.

Average employment in the industries during the first 11 months of the year was 10 per cent greater than in the corresponding period in 1928.

In the rubber industries, including tires and tubes, average employment during the first 11 months of the year was six per cent greater than during the corresponding period in 1928. But November employment was seven per cent less than that of October this year and 9 per cent less than in November last year.

French Plane Output Low

WASHINGTON, Dec. 16—In 1927, the production of airplanes in France amounted to 1150 units with a production of 1800 engines, according to a report from Assistant Automotive Trade Commissioner H. C. Schuette, to the Department of Commerce. In 1928 about 1440 airplanes and 1800 engines were produced. The capacity of the plants during the latter years was for 3000 airplanes and 6000 airplane engines. The figures of production represent totals of all units, both military and commercial.

Glider Production Set at 1000

DETROIT, Dec. 12—Installation of machinery and equipment for manufacturing gliders has been completed in Plant No. 4 of the Detroit Aircraft Corp. This company announced last week the purchase of Gliders, Inc., which is to be known as a division of the Detroit concern. Production has been set at 1000 gliders for 1930, according to E. S. Evans, president.

To Publish Data

BRIDGEPORT, CONN., Dec. 16—The Automatic Machine Co. has announced that it will publish a series of engineering data bulletins on diamond tool boring. The bulletins will be published in loose-leaf form suitable for filing, and will be sent free to anyone interested in the subject.

English Truck Firm Gains

LONDON, Nov. 26 *(Special)*—The report and balance sheet of Dennis Bros., one of England's biggest and oldest truck and bus makers, shows that a net profit (£336,588) equal to over four times the amount of the issued capital was made again during the past financial year (ended Sept. 30 last).

Hearings Announced on Bus Regulation

WASHINGTON, Dec. 16—Hearings on proposed legislation for the Federal regulation of interstate bus traffic will be held by the House Committee on Interstate Commerce, beginning Jan. 8, it has been announced by the Chairman, Rep. Parker (Rep.) of New York. At previous sessions of the committee, it was stated, persons who favored such legislation had been heard, and the new hearings are planned to give those opposed a chance to go on record.

Next Year is Promising, Vane Tells Dealer Group

PEORIA, ILL., Dec. 16—Forecasting the largest business year the automotive industry has ever known for 1930, C. A. Vane, general manager of the National Automobile Dealers Association, speaking at the annual banquet of the Illinois Automotive Trade Association at the eleventh annual gathering here last week, warned the 250 dealers and members that they will have to demonstrate their sales ability as never before during the first quarter.

Revision of methods to conform with new and changed conditions in the industry, he said, is absolutely necessary. Overproduction by the manufacturers and quantity sales rather than sales for a profit are sore spots in the industry and demand corrective measures before the retailers can be put upon a stable plane. The competition which led to effort of mass sales by individual dealers must be moderated to meet the basic law of supply and demand, wherein the consumer will be sold only what he needs, he warned.

David C. Klausmeyer

CINCINNATI, Dec. 16—David Conrad Klausmeyer, internationally known designer of drilling machinery, and assistant to the president of the Cincinnati-Bickford Tool Co., died here Dec. 6. Mr. Klausmeyer had been associated with the company for more than 30 years. He was a member of the American Society of Mechanical Engineers.

George W. Severson

AUBURN, N. Y., Dec. 16—George W. Severson, general manager of the Bowen Products Corp., manufacturer of lubricating devices, died Dec. 6 at Sayre, Pa., according to an announcement received here today. Mr. Severson was connected with the Bowen company and with George W. Bowen, its founder, for 33 years.

Service Products Adding

INDIANAPOLIS, Dec. 16—The Service Products Corp., manufacturer of radiator fans, cowl ventilators, etc., has begun construction of an addition to its plant. The addition will be 150 ft. by 150 ft., and will cost $50,000.

General Motors' Deliveries to Consumers Decline

NEW YORK, Dec. 16—During the month of November, General Motors dealers delivered to consumers 90,871 cars, according to an announcement by Alfred P. Sloan, Jr., president. This compares with 91,410 for the corresponding month a year ago. Sales by General Motors manufacturing divisions to dealers amount to 60,977 cars, as compared with 47,587 for the corresponding month last year.

The following tabulation shows monthly sales of General Motors cars by dealers to ultimate consumers and sales by the manufacturing divisions of General Motors to their dealers:

Dealers Sales to Users

	1929	1928	1927
Oct.	139,319	140,883	153,833
Nov.	90,871	91,410	80,539

Divisions Sales to Dealers

	1929	1928	1927
Oct.	122,104	120,876	128,459
Nov.	60,977	47,587	57,621

These figures include United States, Canadian and overseas sales of Chevrolet, Pontiac, Olds, Marquette, Oakland, Viking, Buick, LaSalle and Cadillac passenger cars and trucks.

Curtiss to Build in Chile

SANTIAGO, CHILE, Dec. 4 *(Special)*—The Curtiss Airplane Export Corp. will establish an airplane factory at Cerillos, Santiago's airport, it became known here when President Carlos Ibanez, and C. W. Webster, president of the Curtiss Export Corp., signed a contract in which the government agrees to furnish land at the airport for factory buildings. The new factory, with necessary machinery, and other equipment, will cost in the neighborhood of $500,000, and is expected to be in operation within a year.

Desoutter Plane Announced

LONDON, Dec. 6 *(Special)* — The Desoutter sports coupe, a new light cabin plane, powered with a Hermes 105-hp. engine, and having a cruising speed of 98 m.p.h., has been selected by the National Flying Services, Ltd., for aerial taxi service. The new plane is said to be the first British plane designed to meet the needs of the private owner. It accommodates the pilot and two passengers, in an enclosed cabin.

Johns-Manville Subsidiary Formed

NEW YORK, Dec. 16—The Johns-Manville Corp. has organized a subsidiary, the Johns-Manville Sales Corp., to deal in asbestos products. The new subsidiary, which is capitalized at 100,000 shares of stock to be assumed by the parent company, will handle operations abroad.

To Use Diesel Buses

LONDON, Nov. 26 *(Special)*—It is reported today that the London General Omnibus Co. will shortly apply to the London licensing authorities for permission to put into service a small fleet of experimental buses with various types of compression-ignition engines using heavy oil as fuel.

Automobile Makers Enter Pittsburgh Steel Market

PITTSBURGH, Dec. 16—Automobile companies have definitely begun to place orders in the Pittsburgh steel market. The Ford Motor Co. is accepting about 25 tons per day of chrome-alloy steels for radiator shells, lights, and trim, it is understood here. Several mills received a portion of the Ford order which included specifications on stainless steel, rustless iron, and "18-8" mixture. It is expected that Ford will ultimately order largely in one classification.

Chevrolet is expected to place orders later in the week and other companies are taking an active interest in the market. Some body makers are placing rush orders. One mill started up late last week after it had shut down in order to get out a rush order for a body-maker. The price situation is unchanged.

Crude Rubber Quiet

NEW YORK, Dec. 16—Crude rubber trading has been exceedingly listless during the past week, according to the F. R. Henderson Corp. The rubber industry is expecting a marked decrease in demand for tires for original equipment next year, due to the probable curtailment of automobile production, but it also looks for an increase in tires for replacement, especially during the early months of the year.

Announces Increase

SHELBY, OHIO, Dec. 16—Plant operations at the Ohio Seamless Tube Co. in the first two weeks of December showed a 40 per cent increase over the rate of operations for November, President A. C. Morse has announced. The increase in operations, according to Mr. Morse, is largely due to a revival in ordering by the automotive and oil industries, and also by machine and engine builders. Mr. Morse also announced that the company's $400,000 plant addition will be ready for operation by the middle of January.

Hoover Hears Views of Trade Editors

WASHINGTON, Dec. 16—Secretary of Commerce Lamont and Assistant Secretary Julius Klein discussed business conditions at a private dinner for 150 editors of technical and trade publications held at the National Press Club here tonight. The dinner was a continuation of a closed meeting held earlier in the day at which the editors reported directly to President Hoover their views on the present situation in industry and trade.

Olympia Attendance Gained

LONDON, Nov. 22 *(Special)* — The attendance of paying visitors at the recent truck and bus show at Olympia was appreciably higher than at the last British show of this kind in 1927. In 1927 the total attendance for the nine days of the show was 51,854, while in this year's show the total attendance for the same period was 64,802, a new record for shows of this kind in England.

G. M of Canada Output Up

OSHAWA, Dec. 17—It has been announced by General Motors of Canada that the total production by the plants of the Canadian branch of the General Motors Corp. in the 1929 season is estimated at 103,000 units, an increase of 1000 units over the total production in 1928.

Hilo Opens Detroit Office

DETROIT, Dec. 17—The Hilo Varnish Corp., of Brooklyn, announces that it has opened a new office in the General Motors Bldg. Frank J. Keeley will be manager.

G.M. Canadian Plants Gradually Resuming

OSHAWA. Dec. 16—The local and Walkerville plants of General Motors of Canada, Ltd., are assuming pre-season activity. Some production is now under way on the Buick and Pontiac lines, although the other assembly lines are idle.

The Walkerville plant is now running at about half strength, with approximately 850 men on the payroll, of which about 500 are in the Chevrolet motor plant making motors for use in the assembly lines at Oshawa. The balance are working in the coach and truck division of General Motors of Canada, which is located in Walkerville. The Regina plant, being an assembly plant only for Western Canada, is still inactive but will probably start operations as soon as the assembly lines do in Oshawa.

Stanley Forms Subsidiary

NEW BRITAIN, CONN., Dec. 16—The Stanley Works announces the formation of the Stanley Electric Tool Co. This new company will manufacture and distribute the electrically operated hand tools developed by the Stanley Rule & Level Co.

The recent purchase of the Unishear Co., New York, and the Ajax Electric Hammer Corp., New York, has been announced by the Stanley Works.

Speedway May Be Sold

ALTOONA, PA., Dec. 16—Bondholders of the Altoona Speedway Association, through their trustees, have taken action in alleged default of interest on a $100,000 mortgage, applying for a writ of sci. fa. in Blair County Common Pleas Court. The application for the writ, which marks the first step in foreclosure proceedings, has been filed in the office of the prothonotary of Blair County by attorneys who represent more than 95 per cent of the bondholders.

Calendar of Coming Events

SHOWS

New York National.....Jan. 4-11
East Orange, N. J., Automobile ...Jan. 8-11
Newark (N. J.) Automobile Show.Jan. 11-18
Philadelphia, Automobile .....Jan. 11-18
Buffalo, Automobile .....Jan. 11-18
Milwaukee Automobile Show ....Jan. 11-18
Toronto, Automobile .....Jan. 11-18
Cincinnati, Automobile .....Jan. 12-18
Boston, Automobile .....Jan. 18-25
Detroit, Automobile .....Jan. 18-25
Baltimore, Automobile .....Jan. 18-25
Harrisburg, Automobile .....Jan. 18-25
Louisville, Automobile .....Jan. 18-25
Hartford, Automobile .....Jan. 18-25
Pittsburgh, Pa., Automobile .....Jan. 18-25
Brooklyn, Automobile .....Jan. 18-25
Montreal, Automobile .....Jan. 18-25
Louisville, Automobile .....Jan. 18-25
Los Angeles, Automobile .....Jan. 18-26
Rochester, Automobile .....Jan. 20-25
Washington, D. C., Automobile Jan. 25-Feb. 1
Chicago National, Coliseum..Jan. 25-Feb. 1
Cleveland Automobile Show..Jan. 25-Feb. 1
Copenhagen Trucks, etc. ....Jan. 25-Feb. 2
Columbus, Automobile .....Jan. 26-Feb. 1
Portland, Me., Automobile...Jan. 27-Feb. 1
Wilkes-Barre, Automobile ...Jan. 27-Feb. 1
San Francisco, Cal., Automobile..Feb. 1-8
Minneapolis-St. Paul, Automobile..Feb. 1-8
Toledo, Ohio, Automobile .....Feb. 3-8
Wichita, Automobile .....Feb. 3-8
Cumberland, Automobile .....Feb. 3-8
Syracuse, Automobile .....Feb. 3-8
Ottawa, Automobile .....Feb. 3-8
Peoria, Automobile .....Feb. 4-8
St. Louis, Automobile .....Feb. 4-9
Cincinnati, Aircraft .....Feb. 8-14
Albany, Automobile .....Feb. 8-15
Akron, Automobile .....Feb. 8-15
Kansas City, Automobile .....Feb. 8-15
New York, American Legion, Aviation .....Feb. 9-15
Denver, Automobile .....Feb. 10-15
Indianapolis, Automobile .....Feb. 10-15
Sheboygan, Automobile .....Feb. 10-16
Mankato, Automobile .....Feb. 12-15
Providence, Automobile .....Feb. 14-22
Canton, Automobile .....Feb. 15-22
Omaha, Automobile .....Feb. 17-22
Copenhagen, Automobile .....Feb. 21
Camden, N. J., Automobile..Feb. 24-Mar. 1
Des Moines, Automobile ....Feb. 24-Mar. 1
Seattle, Wash., Automobile..Feb. 25-Mar. 2
Detroit (All-American Aircraft)..April 5-13

CONVENTIONS

National Automobile Dealers Association, New York City .....Jan. 6
American Road Bldrs. Assn., Atlantic City .....Jan. 11-18
Equipment for Motor Trucks, Inc., Atlantic City (during road show) Jan. 15
American Institute Electrical Engineers, New York .....Jan. 27-31
National Automotive Dealers Association, Chicago .....Jan. 27-28
Ohio Assn. of Commercial Haulers, Cleveland .....Jan. 30-31
Southwest Road Show and School, Wichita .....Feb. 25-28
American Society Mechanical Engineers, Fiftieth Anniversary Celebration:
New York .....April 5
Hoboken, N. J. .....April 7
Washington, D. C. .....April 8-9

S. A. E.

Annual Meeting, Detroit.....Jan. 21-24

SALONS

Hotel Biltmore, Los Angeles.....Feb. 8-15
Palace Hotel, San Francisco, Feb. 22-Mar. 1